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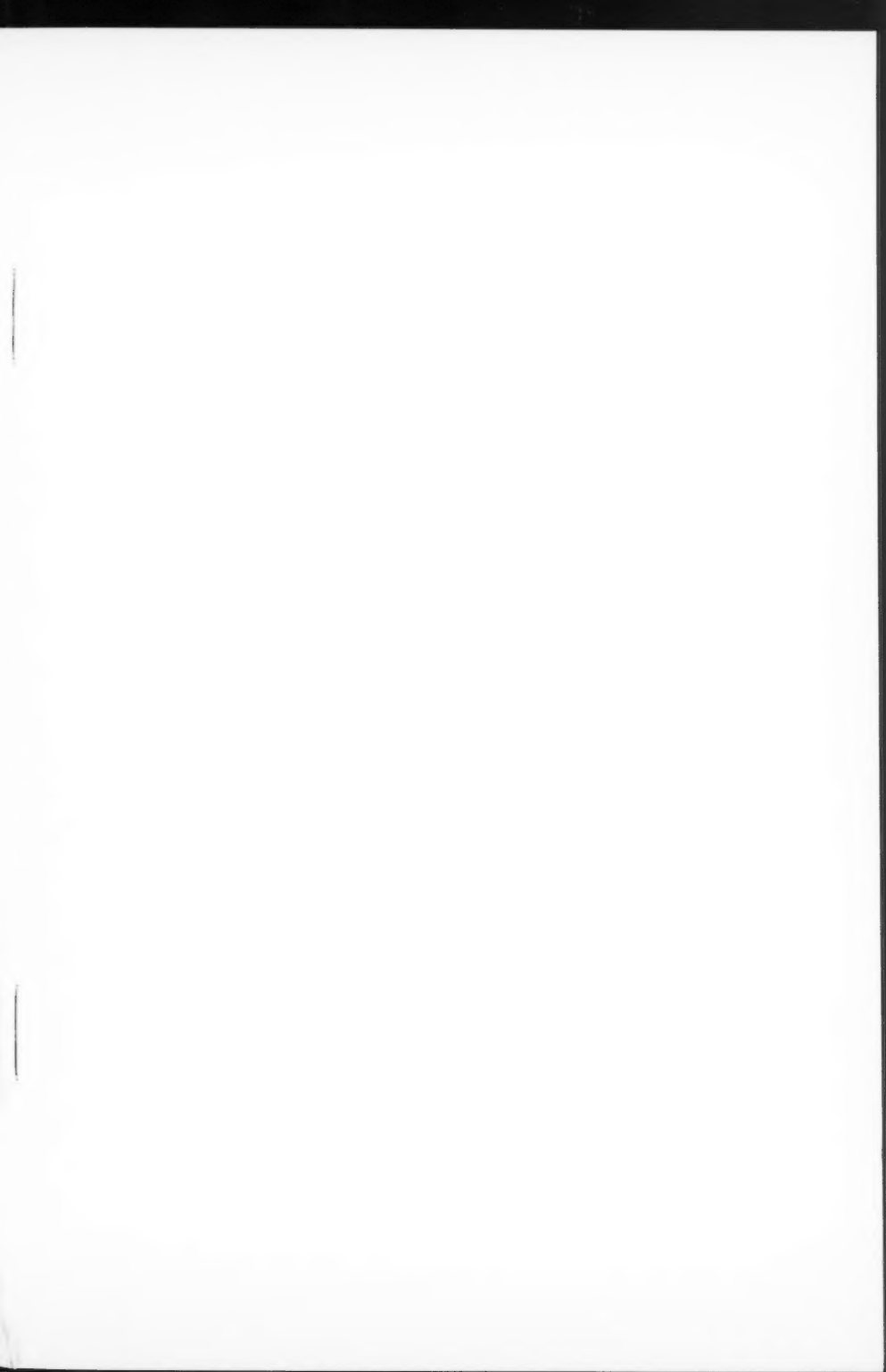
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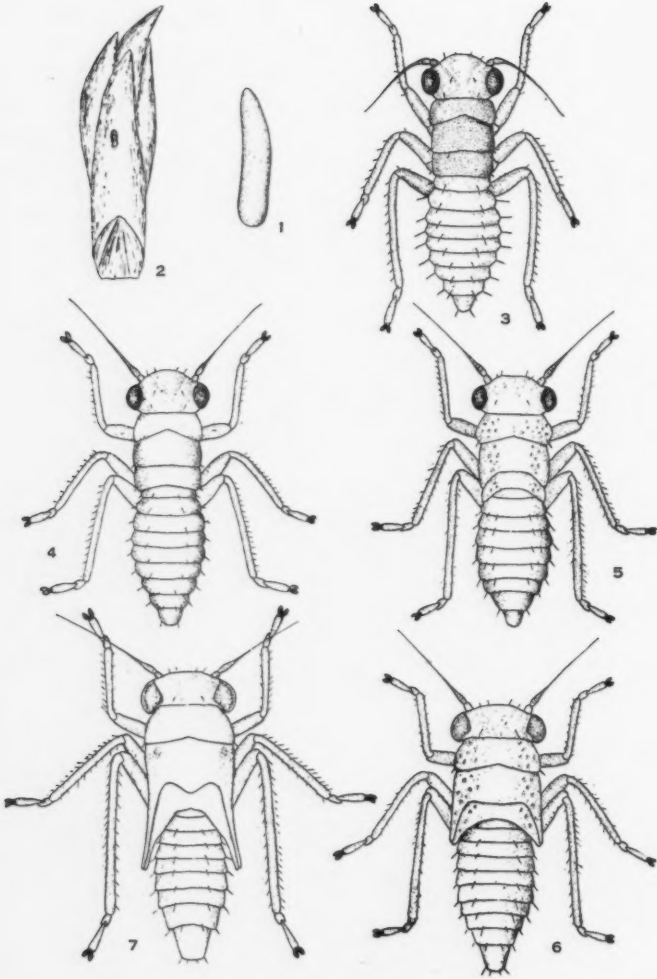
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EMPOASCA OBTUSA—LEONARD.

ENTOMOLOGICAL NEWS

AND
PROCEEDINGS OF THE ENTOMOLOGICAL SECTION
ACADEMY OF NATURAL SCIENCES, PHILADELPHIA.

VOL. XXVII. FEBRUARY, 1916. No. 2.

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The Immature Stages of two Hemiptera—*Empoasca obtusa* Walsh (Typhlocybiidae) and *Lopidea robiniae* Uhler (Capsidae).*

By M. D. LEONARD, Ithaca, N. Y.

(Plates II, III)

Empoasca obtusa Walsh (Plate II).

During the early spring of 1915 twigs of the common cottonwood, *Populus deltoides* Marsh, and of the Lombardy Poplar, *Populus nigra italica* Du Roi, were brought into the Cornell Insectary for the purpose of rearing a species of *Idiocerus* (*Bythoscopidae*) which was known to infest them. Four or five days before the nymphs of *Idiocerus* began to hatch, several small, greenish-yellow, first-stage nymphs were observed running actively about on the opening buds of the

* Contribution from the Department of Entomology of Cornell University.

Lombardy poplar. These greatly resembled nymphs of the apple leaf-hopper, *Empoasca mali* Le Baron. One of these first-stage nymphs was described on April 15, and the first fifth-stage nymph was observed on April 25. The trees from which the twigs were taken were not again examined until July 31. On the latter date one adult was found on each species of poplar. No egg pouches were observed.

The following descriptions of the nymphal stages are based on rearings made in the Cornell Insectary during the spring of 1915. The drawings were made by the writer. The adult was kindly determined for me by Prof. Herbert Osborn.

R. L. Webster (Ent. News, xxi, 265-266) states that "the young nymphs were characterized by dull, reddish tibiae and tarsi. The eyes and antennae were red brown." In the specimens which the writer reared the tibiae were entirely pale and the tip of the tarsi was dusky in stage I, more brownish in stage II. The eyes were dark reddish and the antennae dusky rather than red brown.

The Egg (Fig. 1). *Empoasca obtusa* spends the winter in the egg-stage. On April 17 egg-pouches of this insect were observed on the twigs in the Insectary. They resembled those of *Empoasca mali* Le Baron, and were situated on the outer side of the larger bud scales. (See Fig. 2. Tissue has been removed to show anterior end of egg.) This differs somewhat from the observations of R. L. Webster, who states that he found the egg-pouches placed "in wood two or three years old, which on poplar trees is comparatively soft wood." The buds at this time were just beginning to burst. Eggs are placed singly in the pouches.

Length of egg, 1.1 mm.; greatest width, 2.7 mm.; pale translucent, shining, cylindrical, rather strongly curved, bluntly rounded at posterior end, tapering somewhat and more sharply pointed at anterior end.

Stage I (Fig. 3). Length, 1 mm.; width of head, including eyes, .36 mm. General color pale greenish yellow or pale translucent slightly tinged with greenish. Thorax slightly suffused with dusky, eyes reddish. Antennae, except basal segment, dusky. Legs pale translucent tinged with dusky, tip of tarsi, and the claws darker.

Stage II (Fig. 4). Length, 1.44 mm.; width of head, including eyes, .414 mm.; general color pale greenish yellow. Eyes reddish. An-

tennae and legs as in preceding stage, tip of tarsi, and the claws brownish.

Stage III (Fig. 5). Length, 1.7 mm.; width of head, including the eyes, .558 mm.; general color pale greenish yellow. Thorax sparsely mottled with faint dusky spots. Eyes dusky. Antennae and legs as in preceding stage. Wing-pads becoming apparent.

Stage IV (Fig. 6). Length, 2.25 mm.; width of head, including eyes, .684 mm. General color pale greenish yellow. Thorax often faintly mottled on lateral margins with dusky spots as in preceding stage. Eyes pale, faintly tinged with dusky. Antennae pale, slightly tinged with dusky, except basal segment. Wing-pads extend back to second half of third abdominal segment.

Stage V (Fig. 7). Length, 2.61 mm.; width of head, including eyes, .846 mm. General color pale greenish, abdomen tinged with yellowish. Mesothorax often with a faint dusky spot on either side near cephalic margin. Wing-pads reach back nearly to sixth abdominal segment. Antennae pale yellowish. Eyes pale yellowish, slightly tinged with dusky at inner margin and with a reddish stripe near outer margin. Femora pale greenish; tibiae and tarsi pale yellowish, extreme tip of second tarsal segment, and the claws dusky.

Adult.—The original description of this species, as given by Walsh, Proc. Boston Soc. Nat. Hist., 9, 316 (1864), is as follows: "Pale grass green. Front of head forming a very obtuse angle with the apex rounded off. Each ocellus surrounded with a fuscous spot. Eyes and tips of the tarsal joints fuscous; elytra greenish-subhyaline; tips hyaline. Triangular cell peduncled. Wings hyaline. Length to tip of wings, three-sixteenth of an inch."

Lopidea robiniae Uhler (Plate III).

On June 10, 1915, a number of reddish, first-stage Capsid nymphs, with a white band at the base of the abdomen, were observed on the leaves of the common locust, *Robinia pseudo-acacia* L., at Honeoye Falls, New York. On June 21, third and fourth-stage nymphs were obtained, and on June 26, the first fifth-stage nymph was observed. July 7 fifth-stage nymphs were very common and on July 10 two adults were taken in company with the nymphs. These were kindly determined for me by Mr. H. H. Knight as *Lopidea robiniae* Uhler. A few fourth-stage nymphs were also present on this date. Although the younger nymphs were more commonly seen on the leaves, the older ones rested, for the most part, on the smaller twigs. When the hand was brought near they would run rapidly, keeping always on the opposite side. By July 31 most of the nymphs had transformed to adults.

It is possible that *Lopidea robiniae* is two-brooded, at least in New York State. Mr. H. H. Knight has kindly informed me that during 1915 at Wyoming, New York, most of the nymphs had matured by the latter part of July. No specimens were again taken until August 12, when 8 adults and 3 fifth-stage nymphs were collected on locust. These were apparently stragglers from the first brood. Although constant search was made for *Lopidea robiniae* no more specimens were found until September 14 at Wyoming, when adults were very abundant. Five or six fifth-stage nymphs were collected and about 163 adults, many of which were teneral.

If the species is one-brooded it is possible that the exceptionally cool, rainy weather which prevailed throughout western New York during June and July, 1915, delayed the hatching of many of the over-wintering eggs until the early part of August. This would give the nymphs about a month to produce such a large number of adults as was found by Mr. Knight on September 14.

The foliage of the trees on which the nymphs were most abundant was injured to a considerable extent by a characteristic yellow stippling and sometimes in addition the leaves were crumpled. When feeding, the nymphs remained mostly on the under side of the leaves.

Stage I (Fig. 1). Length, 1.35 mm.; greatest width of abdomen .576 mm. Head pinkish, a whitish, rather indefinite procurved line on vertex connecting the eyes. Each thoracic segment with two dusky spots as shown in the figure. Laterad of spots on pro- and mesothorax, whitish; whole of metathorax, median line on thorax and behind spots on the two thoracic segments, tomato red. Abdomen tomato red, except for second half of first segment, the whole of the second and a rather indefinite spot on lateral margin of segments 3-6 inclusive, white. Opening of dorsal gland indicated by a dusky spot. Antennae reddish, paler at joints; terminal segment covered with fine golden hairs; other segments more sparsely clothed with longer dark hairs. Legs pale brownish, tarsi dusky. Dorsum sparsely clothed with rather long black hairs.

Stage II (Fig. 2). Length, 1.8 mm.; greatest width of abdomen .792 mm. General color tomato red. Head pale grayish or dusky, a white spot behind eyes. Dusky spots on thorax much larger than in preceding stage. As before, lateral margin of pro- and mesothorax

white, the metathorax, the hind margin of pro- and mesothorax and the median line of thorax, tomato red. The median line meets a procurved line on vertex of the same color which connects the eyes. Abdomen as in preceding stage. Eyes and antennae dark reddish. Legs darker than in stage I, almost dusky, femora sometimes slightly paler at tip, tarsi somewhat darker. Body more hairy than in preceding stage.

Stage III (Fig. 3). Length, 2.34 mm.; greatest width of abdomen, 1.00 mm. General color a little darker than in preceding stage. Head and thorax washed strongly with dark grayish or dusky, except for narrow median line and the narrow hind border of the pro- and mesothorax which are tomato red. Head marked as before. Abdomen as in preceding stage. Eyes very dark reddish. Antennae dark reddish to dark brownish gray. Legs dark brownish gray, femora sometimes slightly paler at tip. Wing-pads just beginning to show. Body more hairy than in preceding stage.

Stage IV (Fig. 4). Length, 3.12 mm.; greatest width, across wing-pads, 1.1 mm. More elongate than in preceding stage. Head and thorax entirely overlaid with dusky except for the white spot behind the eyes and the narrow tomato red median line which meets the procurved line of the same color on the vertex. Abdomen as before except that hind margin of first segment and second half of second segment are whitish; seventh segment also has a white spot on lateral margin. Eyes very dark reddish. Legs and antennae almost black. Dorsum now thickly clothed with fine blackish hairs, more abundant than before. Wing-pads reach back nearly to third abdominal segment.

Stage V (Fig. 5). Length, 4.00 mm.; greatest width, across wing-pads, 1.62 mm. Head similar to preceding stage. Ground color of thorax red, strongly washed with dusky except for narrow pinkish median line. Two large, more or less distinct, subquadrate dusky spots on prothorax. Wing-pads are blackish and reach about to second half of fifth abdominal segment. Abdomen with first and second segments marked with pinkish rather than whitish as before; the spots on segments 3-7 also pinkish. Eyes blackish. Legs and antennae more slender and slightly longer than in preceding stages and almost black. Dorsum and legs still thickly clothed with hairs as before.

The individuals of this stage seem to vary in size and color somewhat more than those which I have examined of the other stages. Some are slightly longer than 4.00 mm., others somewhat smaller. Also some specimens are considerably darker, especially on the thorax, than others.

Adult, female (Fig. 6). Length, 6.25-6.50 mm.; width, 2.0-2.5 mm. Orange, with a broad black stripe which extends the whole length of

the insect. Head orange or brownish-yellow with a broad blackish stripe either side of the median line and a small black dot behind the antennal tubercle. In front of the antennae the two stripes fuse into one which runs to the base of the beak. Eyes dark red. Beak, antennae and legs black; coxae and trochanters pale-translucent; venter pinkish.

Male.—Slightly smaller and narrower than female.

EXPLANATION OF PLATES.

Plate II—*Empoasca obtusa* Walsh.

Fig. 1. Egg.

Fig. 2. Bursting poplar bud with egg-pouch. Tissue removed to expose anterior half of egg.

Fig. 3. Stage one.

Fig. 4. Stage two.

Fig. 5. Stage three.

Fig. 6. Stage four.

Fig. 7. Stage five.

Plate III—*Lopidea robiniae* Uhler.

Fig. 1. Stage one.

Fig. 2. Stage two.

Fig. 3. Stage three.

Fig. 4. Stage four.

Fig. 5. Stage five.

Fig. 6. Adult.

Lycaena piasus et *rhaea* (Lep.).

Je crois que les *Lycaena piasus* Boisduval et *rhaea* Boisduval dont j'ai donné les figures sous les Nos. 1950 de la Pl. ccxxxvii et 2078 et 2079 de la Pl. ccxxxix des *Études de Lepidopterologie Comparée* appartiennent à une seule et même espèce.

Le nom *rhaea* doit être supprimé, comme faisant double emploi avec *piasus* plus ancien. Veuillez remarquer ce que j'ai écrit à la page 43 du Volume IX, 1ère partie: "Il est étonnant que Boisduval ait oublié l'espèce qu'il avait appelée *piasus* lorsqu'il a décrit *rhaea*." J'indiquais ainsi mon opinion relativement à *rhaea* synonyme de *piasus*.

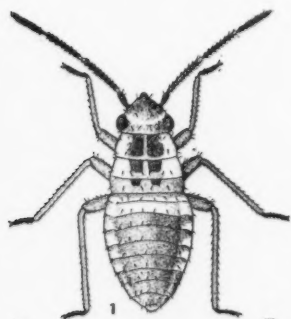
Dans la collection Boisduval le type *piasus* n'est pas bien frais.

Sagittifera Felder (Novara; tab. xxxv, fig. 20, 21) est également synonyme de *piasus*.

Donc la synonymie doit être ainsi établie:

piasus Bdv.
sagittifera Felder,
rhaea Bdv.

CHARLES OBERTHÜR, Rennes, France, 30 Octobre, 1915.



LOPIDEA ROBINIAE—LEONARD.



Hunting Butterflies in the Ozarks (Lep.).

By R. A. SELL, Houston, Texas.

Southern Missouri embraces the only highland region of the Mississippi Valley. These highlands can almost be regarded as one of Nature's scrap heaps, since they contain so many features that are both striking and unique. Being well supplied with water and a diversity of food plants the protected coves and glades and brushy weed patches form an inviting refuge for the butterflies that feed in the open fields of the adjoining states.

Most entomologists are aware of the fact that the Ozark region offers exceptional opportunities for collecting butterflies—especially in the adult stage—but it may astonish some of them to see the unusual range of this list taken in five days. There were three of us in the party and we tramped over the brakes, heavily wooded knobs and the open fields of a district extending from about forty miles northeast of Springfield in a rather wide circle to a little south of east. The start was made on August 22 and the weather was fairly satisfactory. This being the real harvest season, apples, melons and other dainties were very plentiful. Many wild flowers, especially of the composite family, were in bloom. In little coves near the open fields many widely different varieties of butterflies took shelter together. A fifty mile walk in this country will include various kinds of scenery and there are some very prosperous farms in close proximity to scrub-oak wastes and rocky knolls.

The people, mostly of the friendly, easy-going independent small farmer type, are not over curious and are not given to sentiment. "What are you goin' to do with them things?" and "How much do you get for one?" are typical questions. Every one seemed to have plenty of time to stop and talk to us.

Our list is as follows:

Basilarchia disippus
Basilarchia weidemeyeri
Basilarchia astyanax
Basilarchia arthemis

Chlorippe celtis
Pyrrhanaea andria
Debis portlandia
Satyrodes canthus

Neonympha gemma	Pieris protodice
Neonympha eurytus	Pieris rapae
Coenonympha ochracea	Catopsilia eubule
Satyrus alope	Meganostoma caesonia
Satyrus charon	Colias eurytheme
Calephelis borealis	Colias philodice
Thecla haesus	Papilio marcellus
Thecla autolytus	Papilio turnus
Thecla melinus	Papilio crespontes
Thecla cecrops	Papilio asterias
Chrysophanus thoe	Papilio troilus
Lycaena lygdamas	Papilio palamedes
Lycaena comyntas	Papilio philenor
Anosia plexippus	Epargyreus tityrus
Euptoieta claudia	Eudamus proteus
Argynnis idalia	Thorybes bathyllus
Argynnis diana	Alchalarus lycidas
Argynnis cybele	Hesperia tessellata
Argynnis alcestis	Hesperia centaureae
Brenthis myrina	Pholisora catullus
Brenthis boisduvali	Pholisora hayhursti
Melitaea harrisi	Thanaos lucilius
Phyciodes nycteis	Thanaos persius
Phyciodes ismeria	Amblyscirtes vialis
Phyciodes phaon	Erynnis ottoe
Phyciodes tharos	Thymelicus aetna
Grapta comma	Atalopedes huron
Grapta satyrus	Polites peckius
Vanessa antiopa	Limochroes taumas
Pyrameis atalanta	Limochroes pontiac
Pyrameis huntera	Euphyes verna
Pyrameis cardui	Euphyes metacomet
Junonia coenia	Poanes massasoit
Nathalis iole	Phycanassa viator

***Nepticula rhamnicola* nom. nov. (Lepid.).**

The name *Nepticula rhamnella*, used by me in describing a new species of *Nepticula* in the Journal of the Cincinnati Society of Natural History, xxi, 96, 1912, is preoccupied by *Nepticula rhamnella* H. S. of the European fauna.

I propose the name *Nepticula rhamnicola* for the American species.
—ANNETTE F. BRAUN, Cincinnati, Ohio.

A New Descriptive Formula.

By C. W. WOODWORTH, University of California, Berkeley, Calif.

The writer has used in his classes for a number of years certain methods for pointing out features of structure which are very evident to the eye, but not easily expressed in simple descriptions.

One of these, which has been particularly helpful, is presented below. It consists in the use of shape formulae for Hemiptera and Coleoptera. It has been found possible to thus describe the structure in question so well that a student can reproduce a recognizable picture from a line of numbers with more accuracy in detail than found in many published illustrations.

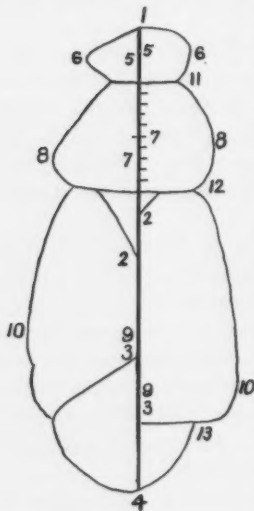
The plan in these formulae has been to determine the measurements a careful artist would make when laying out a drawing and by always arranging the numbers in the same order avoid the necessity of specifying what each measurement indicated. Instead of making these measurements in fractions of inches or millimeters, it was found better to use a portion of the body as a unit and the dimension finally adopted was a tenth of the length of the prothorax. This proved sufficiently accurate for the purpose and not too minute.

The sequence of taking the measurements is indicated on the accompanying figure. The head measurements are taken from measurements from the front edge of the thorax, and the thoracic and abdominal measurements from the hind edge of the thorax. The widths 6, 8, 10, 11, 12 and 13 are measured from side to side, the others along the middle line parallel with the axis of the part. Where the axis of the body bends there should be added (14) the number of degrees bend at the head and thorax articulation and (15) the angle at the pro- and mesothorax articulation. When the pygidium is wanting 3 and 4 would be given as the same size and 13 would read 0, and if the thorax is widest at the hind angles then 7 would be 0 and must be included to avoid the necessity of explaining its absence. The formulae for the bug and beetle

shown on the two sides of the middle line in the figure, are respectively:

5 2 21 27 3 9 5 14 18 18 7 10 10
5 6 15 27 2 8 3 16 13 20 6 12 16

The first measurement is the length of the head which is 5, that is $5/10$ the length of the prothorax in both cases, the second the length of the scutellum, 2 and 6 respectively, the third to the ends of the corium (21) or elytron (15), the fourth the total length behind the prothorax which in both cases figured is $27/10$ of the length of the prothorax.



The next three pairs of measurements give the location of the widest part and the width of each of the three regions of the body. Thus the beetle, at its widest point, is as wide as $18/10$ of the length of the prothorax and this point is $18/10$ behind the hind edge of the prothorax, while the bug is 20 wide at its maximum width, but this point is further forward, being only 13 back of thorax. The last three

numbers are the widths at the three constrictions.

In using these numbers the length of the prothorax, according to size desired, is measured along a line which will serve as the middle line of the insect; then, in order lay off the other dimensions, finally connecting up these points in the way an artist calls "blocking in," giving a sketch very accurate in proportions.

Mr. E. A. Schwarz, Honorary President.

A note in *Science* for Jan. 21, 1916, states that the Entomological Society of Washington has created the office of Honorary President of the society and has elected Mr. E. A. Schwarz thereto. We tender our congratulations to His Honor and to the Society. It is intended that this position will "be tendered only to active members who have been especially prominent in the affairs of the society and to convey with it expressions of gratitude, respect and honor."

Hermetia illucens Breeding in a Human Cadaver (Dipt.).*

By L. H. DUNN, Board of Health Laboratory, Ancon, Canal Zone.

The flies of the Stratiomyidae, or "soldier flies" family, seem to have a great variety of breeding places, especially those of the species that are terrestrial, some being carnivorous, while other nearly allied species will only deposit their eggs on decaying vegetable matter. *Hermetia illucens*, the species so common in both North and South America, shows a considerable variation in the selection of food material for the larvae, but in the literature at hand I have been unable to find any record of their breeding in a human cadaver as in the case which came under my observation, and which may be of interest to those who are engaged in making observations on this family.

A few months ago the body of a man was found lying in the jungle about three miles from one of the settlements in the Canal Zone. It was evidently a case of suicide and death had occurred as the result of a gunshot wound in the head. The body was identified by the metal check and other articles found in the pockets of the clothing as being that of a man who had been missing for more than a month, and evidently had been lying on the ground exposed to the elements for that length of time, and was badly decomposed; the clothing, bones, and a little flesh remaining.

When found, the remains were covered with the long dark larvae of *H. illucens*. They were in such great numbers that some parts of the body, and even places on the sodden clothing, were covered with crawling masses of larvae almost half an inch deep. There must have been several thousands of the larvae on the body upon its arrival at the morgue (which is a building connected with the laboratory), and these were but a part of the numbers covering it when first discovered.

* Read before The Medical Association of the Isthmian Canal Zone, October 16, 1915.

Several hundred of the larvae were collected and placed in a glass jar having about two inches of damp sand in the bottom. Within twenty-four hours all of the larvae had burrowed beneath the surface of the sand, but not deep enough to be seen on the bottom of the jar. None afterwards went to the bottom. They apparently remained just out of sight below the surface. The sand was not kept moist and in a few days became very dry. No food was placed in the jar until the seventh day after the larvae had been placed in it, and then a small piece of decomposed beef, about one inch square, was placed on top of the sand to determine whether the larvae were ready to pupate or whether they would continue to feed. At the end of twenty-four hours all that remained of the beef was the damp place which represented its former position on the sand. No other food was placed in the jar.

The larvae did not cast their skins while pupating but passed the pupal period within the larval skins, which remained unbroken and but very little changed in appearance, until time for the adult flies to emerge. The first adult emerged twenty-three days after the larvae were placed in the jar and they continued to emerge as late as eighty-one days. It was impossible to make a correct estimate of the pupal period as they did not all begin to pupate at anywhere near the same date and the period of emergence was so long.

All of the several hundred larvae collected and bred out were *H. illucens*, no other species being present. No larvae of any other dipterous families were found in the cadaver. This, by the way, is remarkable, considering the number of *Chrysomyia macellaria*, and other flies whose larvae are carnivorous, that are found in this region and which are always ready to deposit their eggs in decaying animal matter. A decomposed body, either human or animal, is a favorite breeding place for *C. macellaria*, but not a single larva of this species was found. It is not improbable that the larvae of *H. illucens* in such numbers were sufficiently predaceous to

destroy all other larvae that attempted to live in such close proximity with them.

Howard states: "There are observations on record which seem to show that the larvae of the curious American genus *Hermetia* may live in bee hives, and in the nests of wild bees. At all events, *H. illucens* has been seen hovering about bee hives and thrusting its eggs through cracks in the hives."* The dissimilarity of breeding places as mentioned by Howard and the case which came under my observation would seem to show a considerable diversity in this species in the selection of breeding places.

I wish to express my thanks to Mr. Frederick Knab, of Washington, D. C., for his kindness in identifying the flies for me.

The Bee-genus *Halictoides* in North America (Hym.).

By T. D. A. COCKERELL, University of Colorado, Boulder, Col.

The genus *Halictoides*, as the name indicates, consists of more or less *Halictus*-like bees, which however belong to the Panurgine series. The species are not very numerous, but are often remarkable for their secondary sexual characters. One of the most extraordinary, with the male legs elaborately produced into spines and angles, has been separated by Viereck as a distinct genus, *Cryptohalictoides*. This species, *C. spiniferus* Vier. comes from Nevada. Several subgenera have also been recognized. Cockerell and Porter (*Ann. Mag. Nat. Hist.*, Dec. 1899, p. 420), after investigating the mouth-parts of a number of species, concluded that typical *Halictoides* (type *H. dentiventris* Nyl.) was not represented in America, and placed the American species then available in a new subgenus *Parahalictoides*; with the exception of *H. marginatus*, which fell in another subgenus, *Epihalictoides*. A third American subgenus is *Conohalictoides* Viereck, based on *H. novaeangliae*

*Howard, L. O.—"The Insect Book," Page 128. Doubleday, Page & Company, New York, 1912.

(*lovelli* Vier.). *Neohalictoides* Vier. cannot be separated from *Parahalictoides*, the type of the former (*maurus*) being closely related to that of the latter (*campanulae*).

The following table separates the known species. *Halictoides oryx* Viereck is confirmed as a valid species by the discovery of the female. I find I have a female taken by Mr. S. A. Rohwer in the Canadian Zone on North Boulder Creek, Colorado, at flowers of *Grindelia erecta*, Aug. 21, 1907. It is larger than *H. tinsleyi*, and is readily separated by the distinctly green mesothorax, and greenish tints on middle of abdomen. The head is very broad, and the mesothorax very hairy.

Stigma clear amber color; wings perfectly hyaline	1
Stigma dusky or dark; wings usually brownish, or at least not quite clear	2
1. Area of metathorax dull, minutely sculptured (late summer and autumn species)	<i>marginatus</i> Cress.
Area of metathorax shining (spring species) ..	<i>pulchricornis</i> n. sp.
2. Face narrow, facial quadrangle conspicuously longer than broad, (species of N. E. States)	<i>novaeangliae</i> Rob.
Face not thus narrow, usually quite broad, (species of W. States).	3
3. Face covered with stiff black hairs, especially dense and abundant between antennae	<i>maurus</i> Cress.
Face not thus covered with black hair	4
4. Mandibles with an extremely long curled tuft of tawny hair beneath; hind tibiae fringed with extremely long white hair, (S. Calif.)	<i>davidseni</i> Ckll., ♂
Mandibles with no such tuft	5
5. Middle basitarsi expanded into a large flat lamina (S. Calif.)	<i>virgatus</i> Ckll., ♂
Middle basitarsi not thus modified	6
6. Hind tibiae enormous, claviform; hind tarsi very short, the basitarsi expanded into a flat lamina (S. Calif.) ..	<i>mulleri</i> Ckll., ♂
Hind legs not thus modified	7
7. Male abdomen with a large tuft of dark fuscous hair subapically beneath, (species from Washington State, allied to <i>maurus</i>)	<i>campanulae</i> Ckll.
Male abdomen without such a dark tuft	8
8. Males; clypeus densely covered with long hair	9
Females	11

9. Mesothorax distinctly green, rather closely punctured all over; antennae very long (New Mexico) *oryx* Vier.
 Mesothorax shining black 10
10. Disc of mesothorax sparsely and weakly punctured. *harveyi* Ckll.
 Mesothorax with strong well separated punctures. *saundersi* Ckll.
11. Clypeus polished, hardly punctured, with a projecting lobe at each lower corner (New Mexico)..... *fallugiae* Ckll.
 Clypeus roughened or conspicuously punctured 12
12. Mesothorax entirely dull; small *Halictus*-like species (New Mexico) *tinsleyi* Ckll.
 Mesothorax shining 13
13. Front and vertex bluish; abdomen with white hair-band on third and fourth segments *mulleri* Ckll.
 No blue tints 14
14. Abdomen with conspicuous white hair-bands..... *virgatus* Ckll.
 Abdomen without hair-bands 15
15. First four segments of abdomen with very broad and conspicuous testaceous hind margins, (S. Calif.) *saundersi* Ckll.
 Abdominal segments not thus margined (N. M.) .. *harveyi* Ckll.

Halictoides pulchricornis n. sp.

♂. Length about 7 mm., slender, black, shining; head and thorax with long white hair, dense and pure white on face; head broad, facial quadrate broader than long; mandibles black, dark red at apex; labial palpi with first joint about 270 microns long, the other three together about 400, the second joint about 170; joints of maxillary palpi subequal, the shortest much more than half length of longest; antennae long, the flagellum, except at base, bright orange-fulvous, dusky above.

Mesothorax polished, hardly punctured; area of metathorax depressed, shining, the basal half with fine plicae; tegulae rufotestaceous; wings hyaline, stigma amber color, nervures darker; b. n. falling short of t. m.; legs black with white hair; middle femora short and deep; hind tibiae large.

Abdomen with hind margins of segments broadly ferruginous, bases of segments with thin white hair-bands; apical plate small, spatulate.

♀. More robust; clypeus shining, with rather large shallow punctures; flagellum very short, bright orange-fulvous, except at base; face very broad; vertex depressed on each side of ocelli; abdomen broad.

Hab.—Mesilla Park, New Mexico, at flowers of plum, April 14 (*Cockerell*). Allied to *H. saundersi* Ckll., but easily separated by the clear wings with amber stigma, and the very feeble, evanescent punctures.

Type in my collection.

Two New Species of *Cerceris* (Hym., Philanthidae).

By NATHAN BANKS, East Falls Church, Virginia.

Cerceris posticata n. sp.

♂. Black, with yellow marks. Face, most of the mandibles, two spots on pronotum, tegulae, postscutellum, bands near hind border of abdominal segments, that on first narrowly interrupted, that on second segment very broad and not narrowed in the middle, the others narrow, but widened on sides, lateral spots on second, third and fourth ventral segments, all yellow.

Antennae rufous, except blackish toward tip above; last joint of antennae barely longer than the preceding, but little curved, third joint plainly longer than the fourth joint. Legs yellow, a black spot on posterior side of each femur. Wings dark, stigma yellowish, marginal cell reaches barely beyond the third submarginal cell.

Clypeus convex, lower edge black, and with three small blunt teeth; hair-lobes one and one-half times their breadth apart. Enclosure obliquely striate on the sides, middle area smooth, elevated, and with a median groove.

Abdomen rather broad, basal segment much broader than long; pygidial area about one and one-third times longer than broad, the sides parallel, except converging close to base, tip truncate. Body moderately coarsely punctate.

Length 11 mm.

From Jemez Mountains, New Mexico, 11 July (Woodgate).

Cerceris stigmatialis n. sp.

♂. Black, with white marks. Face, under side of basal joint of antennae, base of mandibles, two spots on pronotum, outer part of tegulae, postscutellum, band near posterior margin of abdominal segments (except first), that on the second segment broad, barely narrowed in middle, the other bands very narrow, all yellow. Venter without spots, or very small ones. First segment of abdomen sometimes with small spot each side.

Last joint of antennae no longer than preceding, but little curved, third joint slightly longer than fourth.

Wings dark, stigma still darker, marginal cell extends plainly beyond the third submarginal cell. Legs pale yellowish, femur of front and middle pairs mostly black, the hind femora black on apical half or two-thirds; hind tibia black near tip; all tarsi mostly rufous.

Clypeus slightly convex, lower edge truncate, black, and with three small blunt teeth; hair-lobes about twice their breadth apart. Enclosure obliquely striate on the sides, a median groove.

Abdomen moderately broad, first segment a little broader than long; pygidium about one and two-thirds as long as broad, sides parallel,

tip truncate; sides of last ventral segment with rufous hair. Body moderately coarsely punctate, about as in *C. nigrescens*.

Length 12 mm.

From Fargo, North Dakota, September, on *Solidago* (Stevens).

Differs from *C. nigrescens* in absence of large ventral spots, in the dark stigma, and in the longer marginal cell.

The types of both species are in the writer's collection.

A new Species of the Genus *Gammarotettix* from California (Orthoptera, Tettigoniidae).

By MORGAN HEBARD, Philadelphia, Pa.

Gammarotettix cyclocercus new species.

Closely related to the genotype, *G. bilobatus* (Thomas), differing in the somewhat more slender form and strikingly different male cerci, which in *bilobatus* are awl-like, but in the present species are longer and strongly incurved. In *cyclocercus* the male supra-anal plate is similar, but somewhat more decidedly produced. The somewhat more slender form appears to be the only character available in separating females of the two species.

All previously definitely recorded material of *bilobatus*, as well as other specimens of that species before us, were taken in the coastal region and coast ranges of California, while the present species is known from a locality on the lower western slopes of the Sierras.

Type: ♂; Placerville, Eldorado County, California. May 20, 1913. (E. O. Essig). [Hebard Collection Type No. 407.]

Description of Type. Size small for the group; form compact and robust, but not as stout as *bilobatus*. Body cask-shaped; narrowing cephalad and caudad, truncate. Vertex strongly declivent; fastigium with two small tubercles, deplanate between and briefly below these. Eyes small, suborbicular. Maxillary palpi short; first and second joints subequal in length, the two slightly longer than third joint; fourth slightly longer than second; fifth or ultimate joint nearly as long as third and fourth joints taken together, gently and evenly expanding to the truncate, very slightly oblique, apex. Pronotum expanding slightly caudad, cephalic and caudal margins transverse, lateral lobes with ventral margin very weakly convex, ventro-cephalic angle sharply rounded obtuse-angulate, ventro-caudal angle broadly

rounded acute-angulate. Coxae unarmed. Femora short with margins



Fig 1.—*Gammarolettix cyclocercus* n. sp. Dorsal view of supra-anal plate and cerci of type, male. (Greatly enlarged.)

smooth. Cephalic and median tibiae with margins smooth, each supplied distad with four minute spines; caudal tibiae with dorsal margins supplied with alternating brief and very brief spines, armed distad with two pairs of short spurs, the dorsal pair being slightly the longer. Caudal metatarsus supplied with a sharp dorso-distal spine. Supra-anal plate produced between the cerci in two large lobes with apices external, these lobes forming a deep cleft mesad, this continued as a medio-longitudinal suture to the base of the plate. Cerci stout, curving inward mesad above the supra-anal plate, with thornlike apex directed at a right angle to the proximal portion of the cercal shaft. Subgenital plate large and full, surface slightly depressed meso-distad, distal margin subsinuate, transverse.

Allotype: ♀; same data as type. [Hebard Collection.]

Description of Allotype. Agrees with type except in the following features. Supra-anal plate short, bilobate; beneath produced in a shield-shaped plate. Cerci small, awl-like. Ovipositor short, curved weakly upward; dorsal valves bearing on distal half of dorsal margin a number of irregular, moderately broad, transverse teeth, which increase in size to the apex which is formed by a longer, heavy, upward-curved tooth; ventral valves supplied in distal third of ventral margin with five heavy, broad, transverse teeth, the surface of the valves concave between the bases of these. Subgenital plate produced in three long acute projections, of which mesal is slightly the longest, the space between these deeply and narrowly acute-angulate emarginate.

Measurements (in millimeters).

	♂♂		♀♀	
	Type	Paratypes	Allotype	Paratypes
Length of body	11.	11-13.	12.	10-13.
Width of body.....	4.4	4.3-4.5	4.6	4.3-4.7
Length of pronotum.....	3.	2.9-3.3	3.6	3.4-3.6
Length of caudal femur.....	7.6	7.4-8.	7.8	7.4-7.9
Length of ovipositor.....	4.3	4.1-4.6

Color Notes. General coloration prouts brown to buckthorn brown, slightly speckled with a darker shade. Mesonotum and metanotum marked laterad with two heavy bands of dark mummy brown, which diverge regularly and strongly but become gradually weaker, caudad. Outer faces of caudal femora with numerous minute interrupted streaks of dark brown. Subgenital plate of male, as in *bilobatus*, bears a striking dark transverse bar near its proximal margin.

In addition to the type and allotype, we have before us a series of six males and twelve females, bearing the same data, which may be considered paratypes.

Observations on the Habits of *Catocala titania* Dodge (Lepid.).

By ERNST SCHWARZ, St. Louis, Mo.

July, 1913, offered me the first chance to see *Catocala titania* in its natural environment. It was on the 4th and 5th of that month when I was so fortunate as to take four specimens of this species. All were quite worn, which would indicate that they must have been on the wing for some time.

On June 7th, 1914, I happened upon a tract of woods, of about 20 acres, located in the Mississippi bottom, consisting chiefly of water elm, hawthorn and honey locust, with no underbrush. As the place was used for pasturage the lower branches of the hawthorn, *Crataegus crus-galli*, had been trimmed a few years ago, so as not to interfere with the grazing of the cattle. It occurred to me that such a place was the proper environment for *titania*. After a careful search that day I was disappointed, but I captured a fresh specimen of *C. insolabilis*.

The next day, June 8th, 9 A. M., found me in the same place. The weather conditions were not promising, as the night had been cool with a northern breeze. Searching every hawthorn, I at last succeeded in locating a specimen; however, not in plain view, but below the surface of the ground, on the trunk of a hawthorn where the dry weather had contracted the gumbo soil, leaving a crack of about an inch and a half. Blocking off with paper both sides of the crack, then placing the cyanide jar above the space left open, I expected the specimen to become alarmed, but it gave no sign of life. After a few minutes' impatient waiting I tickled it with a blade of grass, when suddenly the moth responded, full of life, trying to escape, but it was mine, for I had successfully covered the jar when it had entered. Thus I made my first capture of a perfect *Catocala titania*.

On June 10th I captured four, on the 11th five, in a similar manner. The night from the 11th to the 12th was warm with a southern breeze. On this day *titania* was to be

found resting up to seven feet above the ground. All specimens taken so far were males. On the 15th with similar weather conditions to those of the 12th I took five males and my first female. It is a beauty, about one-fourth larger than the males. All males taken this day were resting from two to six feet high, and the female on a branch about seven feet from the ground. The 14th and 15th brought me nine more males and two females. This closed the season for *titania*, as rain set in, with a north wind, which means here much cooler weather. Only a few battered specimens were seen after this. The two females taken on June 15th I placed in a paper bag with the object of procuring eggs from them. This proved a failure—both died the second day of captivity.

On June 25th, 1915, I took two females and one male. Arriving home I placed them in a glass globe, such as is used to cover street gas lights, about 18 inches high by 16 inches in diameter. In this I put a one inch twig of *Crataegus crus-galli* to which I pinned some bark of the trunk. The bark of *crus-galli* is quite shaggy and, I considered, would be an ideal thing for *titania's* egg depository.

At 8.30 that evening I observed the male courting the female, much like a sparrow, trying to make itself attractive by many peculiar antics, such as running from one side of the female to the other with wings half extended, exposing the beautiful color of the hind wings. In all these performances the wings were vibrated violently.

In searching for a suitable place to deposit her eggs the female runs about head up or down but oviposition takes place head up. The eggs, from one to sixteen in a batch, are placed beneath the outer layer of the bark.

These observations were made with the aid of an electric light, which was turned on and off at short intervals.

Summary.—*Catocala titania* always rests with head down on *Crataegus crus-galli*, in cool weather very low, often sheltered by weeds or grasses. In warm weather they rest up to seven feet high, always in plain view; there is no need to hide themselves from sight as their color harmonizes with that of

the resting place. They are not easily disturbed and not at all by any kind of sound. Only when coming in direct contact with foreign material are they on the alert at once. When so disturbed they sometimes alight on the ground, keeping themselves perfectly motionless.

C. titania is confined to a single species of tree, *C. crus-galli*, on which it deposits its eggs, feeds and rests. This tree grows in clusters in rich soil along the margins of swamps or near streams, which clusters are widely scattered, often having great distances between them. It is this which prevents, to some extent, the migration of *C. titania* from one cluster of *C. crus-galli* to another. Also it explains Mr. Dodge's and Prof. Rowley's futile search for the species in the type locality between 1900 and 1915 inclusive. Mr. Dodge had, undoubtedly, exterminated it in the cluster of *C. crus-galli* where he first found it.

Two New Mymaridae from the Eastern United States (Hym.).

By A. A. GIRAULT, Washington, D. C.

The following species are the first of the genus *Ooctonus* Haliday to be described from North America.

1. *Ooctonus americanus* new species.

Female. Length, 1.15 mm. Black, the wings hyaline, venation dusky, the abdominal petiole and legs reddish brown, but the femora and tibiae suffused slightly with dusky. Incisions of abdominal segments white.

Fore-wings with fine discal ciliation as in *Polynema striaticorne*, the marginal cilia short, not more than a seventh of the greatest wing width, distinctly shorter than the caudal marginal cilia of the caudal wing, the latter with six lines of discal cilia. Fore-wing with about 22 lines of discal cilia where broadest.

Distal tarsal joint black, the proximal joint of the tarsi of moderate length only.

Flagellum slender; funicle 1 subequal to 2, longest, a little longer than the usual pedicel, the latter pale at tip; funicle 1 about thrice longer than wide; funicle 3 somewhat shorter than 2, 4 considerably shorter than 3; 5 and 6 subequal, shortest, not quite two-thirds longer than

wide; 7 and 8 stouter than the others, subequal, each as long as 3; club stouter than the funicle, equal in length to the three preceding joints or more. Club obliquely truncate from beyond the middle.

Mandibles with three equal, acute teeth.

Described from one female captured April 26, 1915, in the forest at Rock Creek Park, District of Columbia, by sweeping.

Type:—Catalogue No. 19353, U. S. National Museum, the specimen on a slide.

2. *Ooctonus silvensis* new species.

Female: Differs from the preceding in having the legs, except the yellowish hind coxae and whitish proximal three tarsal joints, jet black, and the following antennal differences: Funicle 1 is distinctly longer than 2, which is only somewhat longer than wide, no longer than 3; 6 is globular and shortest, shorter than 5, which is subequal to 4; the marginal vein is distinctly longer; otherwise the same as far as could be seen. Mandibles tridentate in both species. In this species the sculpture is coarsely scaly except distad of a convex line on the scutellum proximad of the middle, where it is glabrous. The propodeum has a median carina, which diverges widely a little out from the base and also strong lateral carinae.

Described from one female captured with the preceding.

Type:—Catalogue No. 19375, U. S. National Museum, the female on a slide.

Pink Katy-Dids and the Inheritance of Pink Coloration (Orth.).

(PART ONE)

By Dr. JOSEPH L. HANCOCK, Chicago, Illinois.

In 1907 Wheeler published a paper on "Pink Insect Mutants," in which he brought together the various recorded instances of the finding of pink katy-dids in the United States.¹ Moreover, in this resumé some data gathered from personal observations were presented in attempting to disprove the earlier supposition that environmental conditions are responsible for pink coloration in katy-dids. The assumption was taken that the pink coloration could not result from temperature acting on the normal green pigment. Katy-dids were

¹American Naturalist, Vol. xli, Dec., 1907, pp. 778-780.

found by Wheeler while sweeping the low vegetation in the prairies of Wisconsin and Illinois, and on one or two occasions he found in his net a few pink larvae and nymphs. It was these young katy-dids that gave him the clew as to the heredity of pink coloration, for the young insects were colored like the adults, and they occurred in the same sweepings with many specimens of the common green form of *Amblycorypha oblongifolia*. Under these circumstances the only interpretation that could be drawn was that the pink katy-did is pink throughout life; the pinkness is therefore congenital or germinal in character, and not the result of environmental conditions. Following upon this supposition it was assumed that the pink form of katy-did was a mutant.

In addition to the normal green form of *Amblycorypha* there are known to be pink, brown or tan, and yellow forms of katy-did, though in the case of the latter only one specimen appears to have been reported.

Wheeler seems to agree with Scudder and Shull in supposing that the pink and probably the brown individuals also represent sports or mutants. The various phases of color above noted with the exception of the green have been regarded as analogous to those of albino animals and certain white flowering plants.

In considering the subject of "Color Sports Among Insects," Grossbeck¹ seems to regard the pink coloration of various insects as indicating sports or mutants, and he does not regard the color as the result of environment.

On the other hand Knab² draws attention to pink and green caterpillars of the same species as being analogous to green and pink coloration of katy-dids, drawing therefrom the conclusion that in all probability the difference in pigmentation is due to absorption of the coloring matter of the leaves of food plants on which the insects feed.

In regard to the latter theory as to the cause of pink coloring, the evidence which I have acquired from my breeding

¹Science N. S. xxvi, pp. 639-640, 1907.

²Science N. S. xxvi, pp. 595-597, 1907.

experiments in crossing and rearing pink katy-dids, as will be noted in the sequence, is in direct refutation. The color of the hybrids confirms the view that the pink coloration is undoubtedly hereditary and obviously of germinal origin. It would follow from this that the color is in no way dependent on the food taken in the body by the individual.

More recently a number of pink katy-dids have been found.³ Mr. Gray of Woods Hole, Massachusetts, found a male pink katy-did in the early part of the summer of 1912, and several years ago a yellow form was taken.

According to Glaser⁴ who reported the latter specimens, a speculative suggestion was made to him by Prof. Morgan, that two factors may be involved, the presence of both of which produced the pink form, the absence of one the yellow, and the absence of both factors the ordinary green form.

Up to the present time but one attempt has been recorded to mate a female pink katy-did, *Amblycorypha oblongifolia*, with a male of the green form. This experiment was attempted by Wheeler, but failed completely. The reason of this negative result was attributed to the fact that it was tried too late in the season, or because the male may have been moribund, or exhausted, before it was placed in the jar with the female. The eggs laid by this insect a few days before her death were thought to have been unfertilized.

Glaser mentions in connection with the live male pink katy-did found at Woods Hole, previously cited, that he intended to cross it with a normal green female to find out what the mendelizing characters are. But no record of the outcome of this proposed experiment has appeared.

EXPERIMENTS IN CROSSING PINK WITH GREEN KATY-DIDS.

The preliminary results of my experiments in crossing pink katy-dids and rearing the hybrids are set forth in the following account. In the course of this investigation I have noted

³Jour. New York Ent. Soc. xxi, pp. 74-75, 1913.—Davis reports specimens of *Amblycorypha oblongifolia* found on Long Island, and Grossbeck thought the allied species unusually abundant in New Jersey during 1912.

⁴Psyche, October, 1912, p. 159.

a number of facts relative to the life history of *Amblycorypha oblongifolia* which were apparently not recorded in the literature. It is expected that with the further breeding experiments now contemplated, the factors of heredity, or gametogenesis, can be more definitely suggested, in spite of the remarkably long period required in hatching the eggs.

SOURCE OF MATERIAL FOR EXPERIMENT; THE ORIGINAL PINK FEMALE.

In the summer of 1910 Miss Nettie Isom, a resident of Kenilworth, Illinois, offered her assistance in obtaining a live pink katy-did for crossing and study, and it was due to her two years' vigilance that she finally succeeded in capturing one of these insects for me on July 14, 1912.¹ I received the living insect two days later, July 16, at my summer quarters at Lakeside, Michigan. Miss Isom reported in a letter that the pink katy-did was found on a currant bush at Kenilworth, and in the two days she had it in captivity "it had grown and changed remarkably," and I infer from this statement that the insect probably molted. On its arrival it was immature, in fact it was a nymph in the instar just preceding the adult stage, and it belonged to the species known as *Amblycorypha oblongifolia*. It was colored an exquisite rose-pink or diluted crimson above, with the underside of the body much paler. After the seventeenth day of its confinement in the cage, it molted August 2, during the night, transforming into an adult. Immediately after molting it was quite pale or blanched, as is the case with molting insects, but by the next day it was nearly the same beautiful shade of pink that it was before the final ecdysis, excepting that in addition to the pink some small dark spots appeared in the adult stage on the now unfolded first pair of wings. The hind tibiae were shaded dark, and slight traces of lines of pigment occurred on each side of the thorax. It is this female pink katy-did that forms the basis of the following experiments.

¹The idea of crossing a pink katy-did with the ordinary green form presented itself as long ago as 1893. In the autumn of that year I found an adult pink female oblong-winged katy-did at Kenilworth while looking for Orthoptera, but it was unfortunately lost.

FIRST SUCCESSFUL EXPERIMENT IN CROSSING THIS ORIGINAL
1912 FEMALE PINK KATY-DID WITH A MALE OF
THE NORMAL GREEN FORM.

On August 9, 1912, a normal green male was introduced in the same cage with the female pink katy-did. Two days later the male was seen making advances to the female, and on the fourteenth conjugation was effected, and the female was noticed with a semi-transparent spermatophore attached to her body. She carried the latter about for a number of hours, when finally I saw her devour about half of the capsular mass, the remaining part dropping to a leaf below the point where she was standing among the leaves of mint growing in her cage. Several times subsequently, notably on August 19 and 21, I saw her with a spermatophore attached to her body, thus establishing the fact that fertilization of the eggs had doubtless occurred, and especially as her abdomen became distended with eggs by the last of August.

EGGS LAID IN THE GROUND.

It was not until August 28th that I actually saw her oviposit, though on the 26th, I saw her searching about on the earth in the bottom of the cage. Near six o'clock in the afternoon of the 28th, I saw her slowly walking about on the wet ground, having come down from her usual abode among the sun-exposed leaves of the mint and goldenrod. At the roots of the latter she nibbled at the soft covering of earth. Then she brought her large ovipositor forward under her body, and with the aid of her mandibles she guided the end to a chosen point on the ground. She was only a few minutes forcing a hole with her ovipositor and laying her eggs in the soft earth. Immediately afterwards I again saw her go about in a similar manner searching the ground, and only a slight distance away she oviposited a second and a third time, apparently only laying a few eggs at a time. Similarly at six o'clock in the afternoon of September 9 and 10, she was seen laying eggs in the vegetable mold. In all probability she laid eggs occasionally in the interval between these dates, as she was incidentally noted from time to time on the ground.

It was about this time that the normal green male began to languish and show signs of enfeeblement in his movements from loss of vitality, and I introduced another wild green male in the cage on September 10. This second male was a fresh-appearing vigorous individual, caught in the vicinity of Lakeside, and he superseded the first male which died two days after this second male was placed in the cage. These two males were distinguishable by the hind tibiae. In the first male they were brownish, while in the second one they were green, otherwise they were quite alike in color. The second male lived until October 17. In the meantime the female proceeded to lay her eggs on the morning of September 15, and also on the 16th and 27th.

At intervals the cold weather affected the pink katy-did, but she showed much more vitality than either of the males. On November 1, a frost occurring in the night so paralyzed her movements that I decided to remove her indoors to another small cage; the original breeding cage bearing the eggs being placed at the same time within my large screened insectary, where it was secure from molestation. After the female was put in the new cage she again oviposited on the evening of November 3, at Lakeside, also once more after I removed her to Chicago on the 8th, so that between the latter date and November 14, the time of her death, she had not been with the male since October 17th. During the entire time, she probably laid in all about thirty eggs, almost all of which I verified by marking the sites.

UNEXPECTED TIME REQUIRED IN HATCHING THESE 1912
EGGS; SOME OF THIS BATCH TWO YEARS,
OTHERS THREE YEARS IN HATCHING.

These katy-did eggs were, of course, subjected to open outdoor conditions. It was natural to expect that as they were laid in the autumn, they would hatch the coming spring, such as occurs in Acridiidae for instance. At least, I first went on this assumption as there was no literature on the subject. I looked in vain in my insectary for the young katy-dids to emerge from these eggs laid in 1912, throughout the following

spring, summer, and fall months of 1913. I began to wonder if ants or spiders had eaten either the eggs or the prospective newly hatched. To satisfy myself on this point I dug up several of the eggs for examination. I found their outer coverings intact, and they appeared unscathed, with no evidence of having hatched. Between the idea that they were not fertilized, or that they were alive, but that they had not sufficient time to hatch, I adopted the latter view, and fortunately placed the eggs I had examined back in the cage, covered them carefully, and securely closed the insectary for the winter of 1913-1914.

THE PINK AND THE GREEN HYBRID PROGENY OF 1914; MORE PINKS THAN GREENS; ALTERNATIVE INHERITANCE.

It was not until the second year, or June 14, 1914, that I found the first evidence of hatching. In the insectary a small living pink katy-did was discovered clinging to the wire screen, and after making an inventory of the family I counted ten of the living progeny in vigorous condition scattered among the foliage of the numerous growing plants, and on the ground. When the eggs hatched the young crawled out of the hatching cage and sought the freedom of the larger area in the insectary for foraging. This progeny consisted of eight pink and two green individuals. The bodies of these insects ranged from ten to twelve millimeters in length; they had evidently undergone one molt. At this time they were in the second instar, and of course all were the same age. On June 26, one of the green katy-dids molted, and rudimentary wings became visible, and on the next day two of the pink individuals molted, entering the third instar. It is an interesting fact that out of this 1914 progeny of ten, the sexes turned out to be evenly divided into five pairs, including one pair of greens, and four pairs of pinks. As they went on maturing these insects maintained the same pink or green coloring; beginning with the larvae shortly after hatching the color remained the same throughout the different instars. With the addition of three retarded katy-dids hatched a year later, 1915, and which is really a part of this progeny, the proportion of pink to green is modified to give a ratio of nine pinks to four greens.

INBREEDING THE PINK AND GREEN HYBRID 1914 PROGENY.

I was able to definitely determine the sexes by June 27, and by this time I had erected a series of cages for pairing purposes containing growing plants. Into these cages was placed the pair of greens, and four pairs of pinks, each pair being given a separate apartment, where they were allowed to mature and inbreed.

At this time, June 28, these insects were placed in charge of Mr. Charles Brewer, of Lakeside, who supervised their care during my absence in California during July and August. On my return to Lakeside, September 1st, I found the mortality confined to one pair of the pink individuals. This male and female were in the same cage and had met with death through becoming entangled in the wire netting. I found the dead female's abdomen full of eggs, and though her body was partly decayed I removed by dissection thirty normally formed eggs, besides two which were not fully formed. These eggs were placed in the ground, simulating the method of the mother, with the expectation that in the case they were fertilized they might possibly hatch. The other four pairs of katy-dids making up the remainder of the progeny flourished, and all four females oviposited during August, September and October. The expectation is that some of these eggs will hatch in 1916, others in 1917. Or, it is barely possible a few may remain until 1918 before they hatch.

COLOR OF THE 1914 HYBRID PROGENY: GREATER INDIVIDUAL DIFFERENCES IN THE MALES.

The four mature pink females were nearly all the same shade of pink or diluted crimson, varying somewhat in the degree of dilution, two being very nearly identical with the beautiful figures given by Scudder in *Entomological News*, May, 1901. These insects were all paler on the underside of the body. In the males there was a more striking difference in the color among the individuals, and this was evident in the early stages, though not so pronounced as in the adults with fully developed wings. One of the males was a deep conspicuous

crimson on the wings and exposed areas of the body, excepting the dark stridulating portion of the wings. Another male was decidedly paler with pinkish flesh-yellow on the upper parts and wings, while a third was purer pink like the females.

That these variations of color signify some differences in their gametic constitution remains to be determined. All these shades of color were seemingly influenced somewhat by humidity, becoming deeper-hued in rainy weather, and returning to lighter shade in hot dry weather. All of this progeny, that is the remaining eight, died between October 25 and 29, from the effects of lowering temperature and resulting frosts. They are all preserved for record.

THE BELATED 1915 PROGENY; HATCHING FROM 1912 EGGS WHICH PASSED THROUGH THE RIGORS OF THREE WINTERS.

What seemed to me to be the most remarkable feature in the life history of pink katy-dids was my discovery that some of their eggs may pass through three winters in the ground before the young emerge. I have already shown that some of these original pink katy-did eggs had skipped a year and passed two winters before hatching, but that the eggs could withstand the rigors of three winters and then hatch showed a most remarkable endurance to physical conditions.

In regard to this 1915 progeny, I first noticed in my insectary three newly hatched katy-dids from the original 1912 eggs on the 15th of May, 1915. Two of these insects were green and one was pink. This small brood of course was the belated part of the same progeny that hatched in the spring of 1914. These three larval katy-dids were very small, and at the time I found them they had been hatched only a few hours or possibly a day or two. Two of these delicate insects in the first instar, one pink and one green, were later unfortunately killed and eaten by an agelenid spider. I succeeded, however, in rearing the remaining green female, and she came to maturity August 22, 1915. A normal green male was placed in the same cage with this green female on September 3rd. This male was found the previous day in my yard at Lakeside, and, of course, the female is the hybrid offspring of the original

pink female which was crossed with a normal green male. On September 11, and again on the 18th, I saw on each occasion that she carried a spermatophore attached to the end of her abdomen, showing that union of the sexes had occurred, and it is reasonable to suppose her eggs had been fertilized. I saw the green female on the ground several times, her body at this time being fully distended with eggs, and while I did not see her oviposit, she doubtless laid most of her eggs. Proof of this fact was shown by a post-mortem examination following her death, November 1, 1915. I found at this time on dissection only eight eggs in her body, and as the usual complement is about thirty-two, she had doubtless laid in the ground the larger portion. I supplemented these by placing in the ground the eight eggs I recovered from her body.

HABITS OF PINK KATY-DIDS: THEIR EGGS AND HOW THEY ARE LAID.

In reviewing the habits of pink katy-dids, I find that they do not differ from those of the ordinary green form. However, in the course of my investigation, I have observed some points relative to the behavior of *Amblycorypha oblongifolia* which are of general interest, and seem worthy of record. These insects enjoy the sunshine, seeking sunny exposures when possible; are slow and cautious in their movements, and they feed on a variety of leaves of plants, as well as the petals and pollen of flowers. They are especially fond of the leaves of some mints, and the flowers of some of the goldenrods. The adults of the ordinary green form more often frequent the edges of woods and thickets in damp situations. They live above ground among the leaves in preference to the ground, except when laying their eggs. The young emerge during late May or early June, and mature about the first week in August. From the time immediately after they hatch, throughout their lives they remain the same color, showing that this is a character which is hereditary, though as I have noted, the color may be temporarily intensified or may become paler through the action of humidity and temperature. These color fluctuations were determined in my pink katy-dids by comparison with a scale

made in Japanese colors, and making the examinations under different weather conditions.

As in many of the Locustidae during courtship, the male makes advances to the female. Raising his wings at an angle to the body, and lowering his abdomen, he backs toward her to effect conjugation and transfer a spermatophore. After this courtship the female often carries the spermatophore containing the spermatozoa, attached to her body for a period of several hours; this is done in order to give the spermatozoa time to enter the vagina. She finally rids herself of this apparent incumbrance by arching the abdomen downward and forward so she can reach it with her mouth. She then proceeds to pull it off and eat it. The eggs to the number of about thirty develop in the body during the first week in August, and gradually maturing, a few at a time are laid during August, September, October and early November, when conditions are favorable.

There is a noticeable difference between the manner in which the members of *Amblycorypha* lay their eggs from that exhibited in the allied genera *Scudderia* and *Microcentrum*. When the pink or green mother *Amblycorypha oblongifolia* is ready to oviposit she usually comes down to the ground from the vegetation which she frequents. She then searches about on the ground, often among the dead leaves, to find a suitable place to deposit her eggs. She does this very deliberately and slowly feeling her way with her palpi, often nibbling the surface as if testing a suitable place. At times she appears to be quite exacting in her choice of location when at liberty, one of these requisites being a certain amount of dampness of soil, as well as certain surface conditions. When she finds a suitable spot, she curves her abdomen, which is now distended with eggs, forward underneath her body and at the same time seizes the end of the large ovipositor in her mandibles. In this way she directs its point to the desired place in the ground. Then she forces or drills a hole in the earth for the reception of each egg or cluster of eggs. Sometimes they are laid at such a shallow depth in the ground that the rains splash away the dirt covering, fully exposing them to the air.

THE EGGS.

The eggs of this species are distinctly compressed and oval in form, with one side strongly arcuate, and the other much more flattened. They are rather large for the size of the insect, as they are slightly more than five millimeters in length, and average two and a half millimeters across the middle. When the young hatch they make a vertical rent at the larger pole of the egg, the vertical slit turning transversely part way across on one side near the middle of the egg. About thirty-two eggs may be laid by a single female.

Contrasting with the habit of laying the eggs in the ground by *Amblycorypha*, we find in the genus *Scudderia* that members lay their eggs under the epidermis of a green leaf. The insect seizes the leaf with her legs and using her ovipositor as a lance at the edge, she slits a pocket receptacle for holding each egg. The leaf containing the eggs usually falls to the ground later, and there remains through the winter. In *Microcentrum* the eggs are fastened to a twig in two rows, the female preparing the place where they are to be deposited by roughening the surface with her jaws. In the process of laying her eggs, one egg is laid under the other in forming the rows by the use of the saw-like end of the ovipositor.

In the late afternoon of September 27, 1914, I heard a male pink katy-did stridulating. In the sounds made by this insect and two others I heard, I could not detect any differences in the notes from those made by the ordinary green form. Stridulation was indulged in more vigorously on hot nights.

CONCLUSIONS.

1.—I have shown that the pink katy-did crosses freely with the normal green form.

2.—A virgin pink female was mated with a normal green male. Some of the hybrid progeny F₁ which hatched two years and others three years later, respectively, showed in the total progeny two types as follows: Nine bearing the pink coloration like the mother, and four green like the male parent. The sexes were about evenly divided in both the pink

and the green forms. The inbreeding of these hybrid F1 types have thus far been carried to the stage of crossing, their eggs secured in 1914-1915 which are expected to hatch F2 generation in 1916-1917.

3.—The pink and the green color which appeared soon after the first molt in the individuals of the progeny F1 remained practically the same throughout their lives. The pink color as well as the green is hereditary and is undoubtedly of germinal origin as surmised by Wheeler. This precludes the idea of these colors in katy-dids being dependent on absorption of coloring matter taken in with the food as supposed by Knab.

4.—The eggs of *Amblycorypha* are laid in the ground, this habit being materially different from the egg-laying habits exhibited in other katy-dids.

5.—The time required in hatching the eggs is two or three years, showing remarkable endurance to physical conditions.¹

Notes on *Lithocolletis* with Descriptions of new species (Lep.).

By ANNETTE F. BRAUN, Cincinnati, Ohio.

Lithocolletis insignis Wlsm.

A number of mines of this species were found on the underside of leaves of deer-brush, *Ceanothus integerrimus* H. & A. in Yosemite National Park, California, July 26, 1915.

The mine occupies a comparatively small area in which the leaf substance is almost entirely eaten out, and the lower epidermis is closely wrinkled at maturity. The unenclosed pupa is formed at one end of the mine.

The single specimen reared (imago, Aug. 15) is somewhat paler than the usual form of the species and lacks some of the dark margins. The basal streak is connected with the dorsal streak merely by a broken line of white scales. A slight indication of the saffron ground color toward the outer edge of the basal white patch places it somewhat intermediate between the extreme forms described by Lord Walsingham.

In connection with the variations just mentioned in *L. insignis* it is interesting to note that similar modifications in color and pattern occur in *L. hageni*, its nearest relative. In pale specimens of *L. hageni*, the dorso-basal white patch often ex-

¹The distribution in the United States of pink katy-dids, *Amblycorypha oblongifolia* and the allied species will be presented in a second contribution.

tends to the costa, so that the configuration of the basal part of the wing is essentially that of *L. arbutusella*, unmarked however by the line of dark scales which limits the outer margin of the costal portion of the white area in that species. Such specimens always lack the apical spot and some of the dark margins.

Lithocolletis leucothorax Wlsm.

Mines of this species were collected August 8, 1915, on the lower side of leaves of scrub tan oak, *Quercus densiflora* var. *echinoides* Sargent, growing at Rocky Point, Upper Klamath Lake, Oregon. The larva consumes the entire leaf substance within the mine and at maturity throws the lower epidermis into several folds between which are numerous fine wrinkles. The pupa is suspended by a few silken threads.

Lithocolletis diversella n. sp.

I recently reared two specimens of an undescribed species of *Lithocolletis*: One was a miner on huckleberry, *Gaylussacia baccata* (Wang.) C. Koch and the imago appeared August 31, 1914; the other a miner on sorrel tree, *Oxydendrum arboreum* (L.) DC., and the imago appeared May 10 of the following year. Both were collected in the "Sugar Grove Region" near Lancaster, Fairfield County, Ohio.

While the two specimens are identical as regards the configuration of the color markings, there is a very striking difference in the degree of specialization of the scales, and the resulting brilliancy of markings; the metallic luster is found in the specimen from the overwintering pupa only (which is a female). The more brilliant specimen is regarded as the type; absence of the specialized characters in the other specimen (a male) is noted in the description of the species which follows:

Palpi whitish, face metallic golden, tuft dark brown; antennae dark gray, with the eight or nine segments preceding the apex whitish; terminal segment dark. (In the other specimen the tuft is reddish ochereous; antennae pale gray throughout.)

Thorax deep metallic golden, this color extending onto the extreme base of the fore-wings, which elsewhere are golden or reddish brown, but not metallic. The coloring is identical with that of *L. ostensack-enella*. (In the other specimen, the scales of the thorax and fore-wings are identical in structure; the color is a little paler and more ochereous.) The markings of the fore-wings, which are lustrous white in one specimen, scarcely shining in the other, are placed as follows: A very short basal streak just above the fold, margined with dark brown toward the costa; an almost straight fascia at one-third dark margined internally; two posterior costal and two dorsal spots, internally margined; the first

dorsal spot with its apex projecting a little beyond the corresponding but smaller costal spot; second pair of spots curved and almost meeting. A dark brown irregular apical spot, preceded and encroached upon by a streak of white scales. Cilia golden, gray toward the tornus; terminal line of scales dark brown.

Hind wings gray, tinged with red. Legs dark brown, spurs and terminal segments of tarsi whitish or silvery. Abdomen dark brown, whitish or silvery beneath.

Expanse: 5 mm. (male); 7 mm. (female).

The mines on *Gaylussacia* were collected at Lancaster, Ohio, August 21; those on *Oxydendrum* at Sugar Grove (about seven miles distant) and southward, August 20. The mine is of the usual tentiform type on the lower side of the leaf; except for an occasional patch in the center, the leaf substance in the mined area is entirely consumed. One-half of the mine is partitioned off to form a pupal chamber.

Lithocolletis picturatella n. sp.

Palpi whitish, dark on the sides; face and tuft reddish ochereous, the latter with some whitish scales; antennae dark brown above with paler bands.

Thorax and fore-wings brownish ochereous. There are four costal and three dorsal white spots, the second pair uniting to form an outwardly angulated fascia; all are dark margined externally. Of the first pair of streaks, the dorsal is the longer and in some specimens almost meets the costal streak; it is parallel to the dorsal arm of the fascia. The external dark margin of the fascia is continued outwardly at the angle, usually as a dark shade, rather than as dusting; this dark shade sometimes extends between the third pair of spots almost to the apex. Third pair of spots small and opposite. Scattered dusting in the apex is preceded by a small curved costal streak.

Hind wings and cilia gray, brownish tinged. Fore-legs almost black on the upper surface, tarsi white, conspicuously spotted with black above; middle and hind legs ochereous, with some darker shading, tarsi white, with black spots near the ends of the segments above.

Expanse: 6.5-7. mm.

Described from eighteen specimens bred from mines on bayberry, *Myrica carolinensis* Mill. collected in July at East River, Connecticut, by Dr. Chas. R. Ely. Mines of this species have been found in a number of other localities in New Jersey and New York where the food plant occurs.

Types in Dr. Ely's collection, the United States National Museum, and in my collection.

The mine is a brownish blotch on the upper side of the leaf. At the time of pupation, a single prominent ridge extends across the mine.

The nearest relative of this species is *L. bethunella* Cham., from which it can be most easily distinguished by the conspicuous black spots on the upper side of the white tarsi.

ENTOMOLOGICAL NEWS.

PHILADELPHIA, PA., FEBRUARY, 1916.

A Source of Annoyance and Trouble.

A large amount of material is received each year at museums that is not mounted, and if it is to be made available for study it must be in condition to go into the cabinet with exact data. The collector knows where he captured the specimens, but must often think his correspondents are mind readers, as he frequently fails to properly convey this information to those to whom the specimens are sent. Dates are not legibly written on the containers and frequently it is impossible to determine whether figures represent the month or the day of the month. Places not on the map are written on envelopes and the county, state or country omitted. Often names of places are scribbled in such a way as to make translation a difficult and irritating procedure. All data should be written or printed in such a way as to never leave any doubt in the mind of the recipient as to what is meant.

It is a pleasure to receive material from persons who exercise care and good judgment in matters of this kind. From our experience there are many entomologists that should take this to heart and make their specimens of more scientific value and add to the comfort and peace of mind of their correspondents.—H. S.

Rarities (Hym., Neur., Odon.).

It may be worth while to put on record the fact that I once took *Rhinopsis caniculata* Say at Maywood, Cook County, Illinois. I passed the rare insect over to Mr. Ashmead, then busily engaged at Washington in the study of the Hymenoptera, and no doubt it now reposes in some one of the Washington collections.

More than two-score years ago I took in Wickford, Rhode Island, a specimen of *Ululodes quadripunctata* Burm. I have never been so fortunate as to see a second one.

In August, 1889, on the island of Hawaii, I took the female of *Anax strenuus* Hagen. It is the largest of my Odonata. I was on my way from Hilo to Mt. Kilauea, and it may be superfluous to mention that its capture was effected in the midst of a driving rain, since those familiar with Hilo are aware that the rainfall there is measured not in inches,

but in feet. The female of *Anax strenuus* was described by Hagen from a specimen taken on the island of Oahu and preserved at the Copenhagen Museum.

My *Anax strenuus* is still in perfect condition. My *Rhinopsis caniculata*, I trust, is equally so. My *Ululodes*, alas! is possessed of only a thorax, four perfect wings and one antenna. Accidents always happen to uniques, and there was more truth than poetry in the student's answer to the question,—how many legs has an insect? Some have three, some five, some two, but none ever have six.—O. S. WESTCOTT, Oak Park, Illinois.

The Change of Color in the Winter Eggs of *Myzus rosarum* and *Macrosiphum rosae* (Hem. Hom.).

There is a city park near the Entomological Laboratory of the State College of Forestry. Here the writer found this fall two species of rose aphid, *Myzus rosarum* and *Macrosiphum rosae*, on *Rosa rugosa*. They were abundant November 1st. November 4th the winged females were first observed ovipositing. The eggs on deposition were a vivid emerald green, some of which by November 5th had turned to the characteristic black of winter aphid eggs. On the stems at this date were taken all intermediate colors, varying from a bright green, a greenish-tan, deep olive-brown to a black.

It was observed that fresh aphid eggs from these species remained of a greenish hue much longer in the warm laboratory than out of doors. It would be interesting to definitely determine whether the change from green to black is essential; whether or no the change to black keeps the eggs during the winter months at a higher temperature than the temperature of the surrounding medium. A number of factors might be responsible for this color change, such as light, temperature, the presence of an enzyme in the egg.—W. O. ELLIS, Entomological Laboratory, State College of Forestry, Syracuse, N. Y.

Entomological Literature.

COMPILED BY E. T. CRESSON, JR., AND J. A. G. REHN.

Under the above head it is intended to note papers received at the Academy of Natural Sciences, of Philadelphia, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species, will be recorded. The numbers in Heavy-Faced Type refer to the journals, as numbered in the following list, in which the papers are published.

All continued papers, with few exceptions, are recorded only at their first installments.

The records of systematic papers are all grouped at the end of each Order of which they treat, and are separated from the rest by a dash.

Unless mentioned in the title, the number of new species or forms are given at end of title, within brackets.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London.

For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

1—Proceedings, The Academy of Natural Sciences of Philadelphia. 4—The Canadian Entomologist. 8—The Entomologist's Monthly Magazine, London. 10—Nature, London. 11—Annals and Magazine of Natural History, London. 14—Proceedings of

the Zoological Society of London. 21—The Entomologist's Record, London. 42—Journal of the Linnean Society (Zoology), London. 66—Die Naturwissenschaften, Berlin. 68—Science, New York. 92—Zeitschrift für wissenschaftliche Insektenbiologie. 97—Zeitschrift für wissenschaftliche Zoologie, Leipzig. 141—Proceedings, Indiana Academy of Sciences, Indianapolis. 143—Ohio Journal of Science, Columbus, Ohio. 153—Bulletin, The American Museum of Natural History, New York. 179—Journal of Economic Entomology. 191—Natur. Halbmonatsschrift für alle Naturfreunde. 198—Biological Bulletin, Marine Biological Laboratory, Woods Hole, Mass. 204—New York State Museum, Albany. 216—Entomologische Zeitschrift, Frankfurt a. Main. 218—Mikrokosmos. Zeitschrift für die praktische Betätigung aller Naturfreunde, Stuttgart. 249—Journal, Biological Chemistry, Baltimore. 313—Bulletin of Entomological Research, London. 344—U. S. Department of Agriculture, Washington, D. C. 409—Journal of the Academy of Natural Sciences of Philadelphia, 2nd Series. 411—Bulletin, The Brooklyn Entomological Society. 447—Journal of Agricultural Research, Washington. 477—The American Journal of Tropical Diseases and Preventive Medicine, New Orleans. 482—"Bios" Rivista di Biologia Sperimentale e Generale, Genova. 485—Journal of the Royal Microscopical Society, London. 491—Transactions, American Microscopical Society, Decatur, Illinois. 505—Agricultural News, Barbados.

GENERAL SUBJECT. Arndt, C. H.—Some insects of the between tide zone, 141, 1914, 323-36. Blair, K. G.—Luminous insects (Abstract), 10, xcvi, 411-15. Champlain, A. B.—A method of shipping insect collections, 411, x, 105. Crampton, G. C.—Notes on the derivation of winged insects through several lines of descent, 92, xi, 269-73. Escherich, K.—Zeitschrift für angewandte entomologie, Band II, Heft 2. Fabre, J. H.—Obituary notice, 8, 1915, 332-3; also 21, 1915, 264; also 4, 1915, 381-3. Fagnoul?—Bauernregeln aus der insektenwelt, 216, xxix, 69-70. Fehlmann, J. W.—Hydrobiologie auf grenzwacht, 218, ix, 113-17. Felt, E. P.—Report (30) of the State Entomologist on injurious and other insects of the State of New York, 204, Bul. 180. Howard, L. O.—The edibility of insects; The desirability of host labels for parasites, 179, viii, 549, 550. Loeb, J.—The salts required for the development of insects, 249, xxiii, 431-4. Morris, F. J. A.—The centenary of Kirby and Spence's, 4, 1915, 384-6. Smallwood, T. O.—The international rules of zoological nomenclature with appendix and summaries of opinions, Nos. 1-56. [Pub. by T. O. Smallwood, Washington, D. C.]

PHYSIOLOGY AND EMBRYOLOGY. Boring & Fogler—Further notes on the chromosomes of the Cercopidae, 198, xxix,

312-15. **Foot & Strobell**—Results of crossing two hemipterous species, with reference to the inheritance of two exclusively male characters, **42**, xxxii, 457-93. **Lutz, F. E.**—Experiments with *Drosophila ampelophila* concerning natural selection, **153**, xxxiv, 605-24. **Nelson, J. A.**—The embryology of the honey bee, 282 pp. (Princeton Univ. Press).

MEDICAL. **Hewitt, C. G.**—An early reference to the relation of insects to disease, **4**, 1915, 396-99. **Townsend, C. H. T.**—Two years' investigation in Peru of *Verruga* and its insect transmission, **477**, iii, 16-32.

ARACHNIDA, ETC. **Barrows, W. M.**—The reactions of an orb-weaving spider, *Epeira sclopetaria*, to rhythmic vibrations of its web, **198**, xxix, 316-332. **Wells, B. W.**—(See under Diptera.)

Banks, N.—The Acarina or mites. A review of the group for the use of Economic Entomologists, **344**, Of. Secretary, Rept. 108.

NEUROPTERA, ETC. **Folsom, J. W.**—Directions for collecting Collembola, **411**, x, 91-4. **McAtee, W. L.**—A remarkable flight of caddis flies and chironomids, **68**, xlii, 694-5. **Turner, C. H.**—Notes on the behavior of the ant-lion with emphasis on the feeding activities and letisimulation, **198**, xxix, 277-307. **Wasmann, E.**—(See under Coleoptera.)

Bagnall, R. S.—On a collection of Thysanoptera from the West Indies, with descriptions of new genera and species, **42**, xxxii, 495-508. **Engelhardt, G. P.**—Mecaptera of the northeastern U. S., **411**, x, 106-112. **Walker, E. M.**—Notes on *Staurophlebia reticulata* [2 new subsps.], **4**, 1915, 387-95.

ORTHOPTERA. **Ball, E. D.**—Estimating the number of grasshoppers, **179**, viii, 525-7. **Burr, M.**—On the male genital armature of the Dermaptera. Part II: *Psalidae*, **485**, 1915, 521-46. **Fox, H.**—Notes on O. and Orthopteran habitats in the vicinity of Lafayette, Indiana, **141**, 1914, 287-322.

HEMIPTERA. **Hartman, F. T.**—List of the Coccidae in the collection of the N. Y. State Museum, **204**, Bul. 180, 92-109.

Funkhouser, W. D.—A new membracid from Trinidad, **411**, x, 103-5. **Leonard & Crosby**—(See under Hymenoptera.) **Van der Goot**—Beitrage zur kenntnis der Hollandischen Blattlause. Ein morphologisch-systematische studie, 600 pp. (Berlin, R. Friedlander & Sohn).

LEPIDOPTERA. **Alfaro, A.**—La mariposa de la pacaya, 3 pp. (Revista de Educacion, organo de la Escuela Normal, San Jose,

Costa Rica). **Braun, A. F.**—Evolution of the color pattern in Microlepidopterous genus *Lithocolletis*, 409, xvi, 105-166 (1914). **Cleare, L. D.**—A butterfly injurious to cocconut palms in Br. Guiana, 313, vi, 273-78. **Punnett, R. C.**—Mimicry in butterflies, 159 pp. (Cambridge Univ. Press). **Stephan, J.**—Die spinnkunst der raupen, 191, 1915, 427-30. **Webster, F. M.**—Migrating notes on the milkweed butterfly, 4, 1915, 406.

Grinnell, F., Jr.—Some observations on the butterflies of King River Canyon, Sierra Nevada Mts., California, 411, x, 100-2. **Oberthür, C.**—Etudes de Lepidopterologie comparee, Fasc. X, 457 pp. **Seitz**—Die grossschmetterlinge der Erde. Fauna Americana. Lief. 67-74.

DIPTERA. **Felt, E. P.**—Gall midges in an orchard, 179, viii, 550. **Howlett, F. M.**—Chemical reactions of fruit-flies, 313, vi, 297-306. **McAtee, W. L.**—(See under Neuroptera.) **Macfie, J. W. S.**—Observations on the bionomics of *Stegomyia fasciata*, 313, vi, 205-30. **Valenti, A. L.**—Sulla determinazione del sesso nelle mosche, 482, ii, 265-91.

Alexander, C. P.—New or little-known crane-flies from U. S. and Canada. Part 2. Designation of the single-type (lectotypic) specimen of *N. A.* species of *Tipula* described by H. Loew. [21 new], 1, 1915, 458-514. **Edwards, F. W.**—Three n. sps. of the dipterous genus *Olbiogaster*, O. S. in the Br. Mus. collection, 11, xvi, 502-5. **Felt, E. P.**—A study of gall midges, III [many new], 204, Bul. 180, 127-288. **Knab, F.**—Some new Neotropical Simuliidae, 313, vi, 279-82. **King, W. V.**—*Anopheles pseudopunctipennis*, 68, xlii, 934-5. **Wells, B. W.**—A survey of the zoocercidia on species of *Hicoria* caused by parasites belonging to the Eriophyidae and the Itonididae, 143, xvi, 37-59. **Whitney, C. P.**—A new *Tabanus*, 4, 1915, 380-1.

COLEOPTERA. **Ellis, W. O.**—*Leptinotarsa decemlineata*, 179, viii, 520-1. **Haddon, K.**—On the methods of feeding and the mouthparts of the larva of the glow-worm (*Lampyrus noctiluca*), 14, 1915, 77-85. **Lamson, G. H.**—The poisonous effects of the rose chafer upon chickens, 179, viii, 547-8. **Shelford, V. E.**—Elytral tracheation of the tiger beetles, 491, xxxiv, 241-52. **Sell, R. A.**—Some notes on the Western Twelve-spotted and the Western Striped Cucumber beetles, 179, viii, 515-20. **Wasmann, E.**—Neue beitrage zur biologie von *Lomechusa* und *Atemeles*,... Beitrag zur kenntnis der myrmekophilen und termitophilen, 97, cxiv, 233-402.

HYMENOPTERA. **Ballou, H. A.**—West Indian wasps, 505, xiv, 298. **Parrott & Fulton**—Cherry and hawthorn sawfly leaf

miner (*Profenus collaris*), 447, v, 519-28. **Wasmann & Valkenburg**—Ein neues buch ueber das leben und wesen der bienen, 66, xxxviii, 485-8; 497-500.

Banks, N.—New Fossorial H. [13 new], 4, 1915, 400-6. **Cockerell, T. D. A.**—Descriptions and records of bees (cont.), [3 new], 11, xvi, 482-89 (cont.). **Donisthorpe, H.**—Descriptions of a Pteregate and two gynandromorphs of *Myrmica scabrinodis*, with a list of all the known cases of the latter, 21, 1915, 258-60. **Leonard & Crosby**—A n. sp. of *Gonatocerus* (Mymaridae) parasitic on the eggs of a n. sp. of *Idiocerus* (Bythoscopidae) feeding on poplar, 179, viii, 541-47.

The NEWS has received a copy of Part I, Volume I of *ECTOPARASITES*, edited by DR. K. JORDAN and the HON. N. CHARLES ROTHSCHILD, M. A. It measures 11 x 7¾ inches, consists of pages 1-60 with text figures 1-64, and is dated as "Issued December 30th, 1915. Price, Four Shillings. Printed by Hazell, Watson & Viney, Ltd., London and Aylesbury." The second page of the cover states: "This publication will be issued at irregular intervals. Each part can be obtained direct or from booksellers at the price stated on the cover. All communications referring to this publication to be addressed to Dr. K. Jordan, Zoological Museum, Tring (Herts)." The contents of Part I are four papers as follows: K. Jordan and N. C. Rothschild, On some Siphonaptera collected by W. Rückbeil in East Turkestan and Contribution to our Knowledge of American Siphonaptera; N. C. Rothschild, Further Notes on Siphonaptera Fracticipita with descriptions of new genera and species, and On *Neopsylla* and some allied genera of Siphonaptera.

It is of interest to American readers, although perhaps already known to them, to note that Mr. C. F. Baker's collection of fleas has been acquired by the Museum at Tring (p. 54).

The *Revista Chilena de Historia Natural* announces in the first issue of its nineteenth year (dated Enero-Abril de 1915), that, in consequence of the European war, the subvention which it has received from the Chilean Government has been reduced and that the volume will suffer a corresponding diminution in number of pages. Nevertheless, it commences "con el entusiasmo de los primeros días," and numbers 1 and 2 (combined) include a description of *Acrotripteryx porteri*, a new genus and species of Ptiliidae (Trichopterygidae, Coleoptera) by Jean Brethes and an announcement of *Trichotaphe tangolias* Kl. v. G. as a Microlepidopteran new to Chili, whose larva was found attacking potatoes, by Carlos Silva Figuera. Both articles are illustrated.

The indefatigable editor of the *Revista*, Prof. Carlos E. Porter, founded in 1914, the *Anales de Zoología Aplicada*, as an international American publication devoted principally to the biological and systematic study of zooparasites of the Neotropical Region. Among its entomological contents thus far are papers by F. Knab on Simuliidae of Northern Chili (3 pp., 1 new), C. Bruch and J. Brethes on a new Ipid (Scolytid) and a new Encyrtid, respectively, both from Chili, E. Molina on a formula for destruction of scales and other insects, C. H. T. Townsend, Resumé of the work in Peru on *Phlebotomus verrucarum* and its agency in transmitting verruga, and Prof. Porter himself on materials for the economic entomology of Chili (Coccidae). All these articles are well illustrated and, with the exception of M. Brethes', which is in French, are in Spanish.

Both journals are published in Santiago de Chile, printed on good paper, and both contain sections on Scientific News, Chronicle, Correspondence and Bibliography. (*Advt.*)

Doings of Societies.

The Convocation Week Meetings.

The entomological societies announced in the News for December, 1915, (pages 456 and 474), held meetings during the week December 27-31, 1915, at Columbus, Ohio, in affiliation with the American Association for the Advancement of Science and other scientific bodies. Forty-one papers were listed on the program of the American Association of Economic Entomologists (excluding the section of Horticultural Inspection), twenty-seven papers and exhibits on that of the Entomological Society of America, sixteen relating to insects or to problems of general science (and hence, including entomology) on the programs of the American Society of Zoologists, the Botanical Society of America, the A. A. S. in general and its sections B and F, and are mentioned in the accompanying list. The total is 84, as compared with the convocation week figures of 1912, Cleveland (85), 1913, Atlanta (74), and 1914, Philadelphia (96), respectively. If we subtract 13 papers (of the Section of Horticultural Inspection, Am. Ass. Econ. Ent.) from the total for 1914, we have 83, comparable with the figures given for 1915, 1912 and 1913.

In the following list of papers presented at Columbus, classified by subjects, those unmarked are from the program of the Economic Entomologists, those starred (*) from that of the Entomological Society; others are designated by the names, or abbreviations of the names, of the respective societies hearing them.

GENERAL SUBJECTS.—DR. CHARLES WILLIAM ELIOT, retiring President of the American Association for the Advancement of Sci-

ence, The Fruits, Prospects, and Lessons of Recent Biological Science.—GLENN W. HERRICK, Ithaca, N. Y., annual address of the President of the Amer. Ass. Econ. Ent., The Need of a Broad Liberal Training for the Economic Entomologist.—ANTHONY ZELNY, University of Minnesota, The Dependence of Progress in Science upon the Development of Instruments, (Vice-Presidential Address before Section B.)—Symposium on *The Basis of Individuality in Organisms*, C. M. CHILD, E. G. CONKLIN, O. C. GLASER, C. E. McCLUNG and H. V. NEAL (Amer. Soc. Zool.)—F. E. CLEMENTS, Climaxes and climates of Western North America (Bot. Soc. Amer.)—DR. C. GORDON HEWITT, Dominion Entomologist, Ottawa, Canada, A Review of Applied Entomology in the British Empire.*—W. H. LONGLEY, Goucher College, The Doubtful Validity of the Hypothesis of Warning and Immunity Color (Amer. Soc. Zool.)—F. M. WEBSTER, U. S. Bureau of Entomology, Ethnoentomology.*

CYTOLOGY.—DR. FRANK R. LILLIE, The History of the Fertilization Problem. (Address as president of the Naturalists and as vice-president of Section F, A. A. A. S.)—F. PAYNE, Indiana University, The Mitochondria in the Germ Cells of the Male of *Gryllotalpa borealis*. (Amer. Soc. Zool.)—CHAS. W. METZ, Carnegie Institution of Washington, Pairing of Chromosomes in the Diptera, and Sections Showing Pairing of Chromosomes in the Diptera. (Exhibit, Amer. Soc. Zool.)

PHYSIOLOGY.—WM. L. DOLLEY, JR., Randolph Macon College. Negative Orientation in *Vanessa antiopa*. (Amer. Soc. Zool.)—BRADLEY M. PATTON, Western Reserve Medical School, The Change of the Blowfly Larva's Photosensitivity with Age. (Amer. Soc. Zool.)—C. H. RICHARDSON, New Jersey Agricultural Experiment Station, The Attraction of Diptera to Ammonia.*—N. E. McINDOO, U. S. Bureau of Entomology, The Olfactory-Gustatory Sense of the Honey Bee,* and The Olfactory Organs of Lepidoptera. (Amer. Soc. Zool.)—F. E. CHIDESTER, New Jersey Agric. Exper. Station, The Influence of Salinity upon the Development of the Salt Marsh Mosquito.*—E. P. FELT, Albany, N. Y., Climate and Variations in the Habits of the Codling Moth. (This paper is concerned chiefly in recording variations observed in New York State and attempts to explain these by local variations in temperature.)—A. FRANKLIN SHULL, University of Michigan, Parthenogenesis and Sex in *Anthothrips verbasci*.*—W. MOORE, University of Minnesota, How Gases enter Insects.*—S. I. KORNHAUSER, Northwestern University, Changes in *Thelia bimaculata* (Fabricius) Induced by Insect Parasites. (Amer. Soc. Zool.)—A. C. BURRILL, University of Wisconsin, House-Ant Trails and Their Bearing on Economic Control.*—RALPH R. PARKER, Bozeman, Mont., Dispersion of *Musca domestica* Linnaeus Under City Conditions. (An account of dispersion experiments conducted on a large scale.)

GENETICS.—Joint session of the American Society of Zoologists with the American Society of Naturalists for Symposium on Recent Advances in the Fundamental Problems of Genetics.—E. CARLTON MACDOWELL, Carnegie Institution of Washington, The Influence of Selection on the Number of Extra Bristles in *Drosophila*. (Amer. Soc. Zool.)—ROBERT K. NABOURS, Kansas State Agricultural College, Elementary Color Patterns and Their Hybrid Combinations in Grouse Locusts. (Amer. Soc. Zool.)

INSECTS INJURIOUS TO PLANTS.—W. E. BRITTON, Connecticut Agricultural Experiment Station, Notes on Certain European and Other Foreign Insects Occurring in Connecticut* and Further Notes on *Diprion simile* Hartig. (Notes on the distribution, injury, number of generations and parasites of this European sawfly in Connecticut.)—L. HASEMAN, Columbia, Mo., An Investigation of the Supposed Immunity of Some Varieties of Wheat to the Attack of Hessian Fly. (Brief summary of the first year's work, including data collected from plots of different varieties of wheat grown side by side, together with notes on some chemical and physiological variations in the different varieties.)—GEORGE A. DEAN, Manhattan, Kansas, The Hessian Fly Train. (Brief account of the Hessian fly infestation in the State; the organization of the special train; how the train was conducted and the results accomplished.)—H. A. GOSSARD, Wooster, Ohio, County Co-operation to Prevent Hessian Fly Damage. (Describes a method by which an entire county was kept solidly in line, almost no one sowing until advised by the county agent and Station Entomologist to do so.)—H. C. SEVERIN, South Dakota State College of Agriculture, The Life History, Economic Importance and Control of the Carpenter Moth in South Dakota.*—S. B. FRACKER, Asst. State Entomologist of Wisconsin, The Immature Stages of *Schroekensteinia*, a new raspberry pest.*—M. P. SOMES, Mountain Grove, Mo., Some Insects of *Solanum carolinense* L., and their Economic Relations. (Review of life history of certain insects found on this weed and their development when transferred to related economic plants.)—GEORGE G. AINSLIE, Nashville, Tenn., Notes on Crambidae. (Brief outline of the economic significance of Crambidae and notes on the work carried on at Nashville.)—WM. P. HAYES, Manhattan, Kans., A Study of the Life History of the Maize Bill Bug. (Distribution in Kansas, economic importance, life history and habits, and methods of control.)—R. W. HARNED, Agricultural College, Miss., The Small Pink Corn Worm, *Batrachedra rileyi*, in Mississippi. (Brief notes on occurrence of this insect in Mississippi. It must be ranked as a pest of considerable importance.)—W. J. SCHOENE, Blacksburg, Va., The Economic Status of the Seed Corn Maggot, *Pegomyia fusciceps*. (Discussion of the food plants and the condition of the food attacked.)—J. G. SANDERS, Madison, Wis., Records of *Lachnosterna* in Wisconsin.

sin. (Report on the results of using trap lanterns for capturing May beetles.)—JOHN J. DAVIS, West Lafayette, Ind., A Progress Report on White Grub Investigations. (Summary of *Lachnosterna* investigations to date.)—E. N. CORY, College Park, Md., The Columbine Leaf Miner. (Life and seasonal history. Control.)—F. B. PADDOCK, College Station, Texas, Observations on the Turnip Louse. (Bionomical observations made upon this insect in Texas during two years' study of the pest.)—S. W. BILSING, College Station, Texas, Life History of the Pecan Twig Girdler. (Life history of the pecan twig girdler, *Oncideres texana*; methods of control; injury done; food plants, etc.)—H. A. GOSSARD, Wooster, Ohio, The Clover Leaf Tyer, *Ancylis angulifasciana*. (Life history, character of damage and control.)—J. S. HOUSER, Wooster, Ohio, *Dasyneura ulmea* Felt, an Elm Pest. (Causes malformations in the terminal twigs of elm), and A New Method of Subterranean Fumigation.—T. J. HEADLEE, New Brunswick, N. J., Sulphur-Arsenical Dusts Against the Strawberry Weevil. (Among the fifteen different treatments given the plants just as the weevils began their work, the sulphur-arsenical dusts gave the best results and afforded a high degree of protection.)—C. L. METCALF, Columbus, Ohio, The Effect of Contact Insecticides on the Larvae of Syrphidae.—V. I. SAFRO, Louisville, Ky., The Accurate Determination of the Nicotine Content of Spraying Solutions—WALTER C. O'KANE, Durham, N. H., Arsenic on Fruit and Forage Following Spraying. (Sheep poisoning; loss of lead arsenate residues on hay; maximum residues on fruit; conclusions as to factors determining amount of residues.)—W. H. GOODWIN, Wooster, Ohio, The Control of the Grape Berry Worm, *Polychrosis viticava*. (Deals with the life history in Northern Ohio and the development of control methods for the berry worm.)—J. L. KING, Cleveland, Ohio, Notes on the Control of Lesser Peach-tree Borer. (Cultural methods such as pruning and cultivation; also time to "worm the trees.")—See also under "Physiology," "Parasites of Insects" below.

INSECTS INJURIOUS TO MAN AND DOMESTIC ANIMALS.

—WILLIAM MOORE, University Farm, St. Paul, Minn., Fumigation of Animals to Destroy their External Parasites. (An account of a new material which can be used to fumigate animals and destroy their parasites without injury to the animal.)—DON C. MOTE, Ohio Agricultural Experiment Station, Warble-Fly Injury.* (Exhibit.)—See also under "Physiology."

APICULTURE.—MORELY PETTIT, Guelph, Ontario, Outline of Apiary Inspection in Ontario.—H. A. SURFACE, Harrisburg, Penn., Suggestions for Efficiency and Economy in Apiary Inspection Service.—E. R. ROOT, Medina, Ohio, The Desirability of Inspection Work from the Standpoint of Queen Breeders.—A. H. MCCRAY, Washington, D. C.,

Some Difficulties in Cross Diagnosis of Disease.—H. A. GOSSARD, Wooster, Ohio, Honey as a Carrier of Pear Blight Germs.

PARASITES OF INSECTS.—L. O. HOWARD, Washington, D. C., An Appreciation of the Hawaiian Parasite Introduction Work. (Brief account of observations made and facts learned on a visit to Oahu in August, 1915—an effort to show more emphatically than has hitherto been done, the importance of the results accomplished.)—JOSEPH H. MERRILL, Manhattan, Kansas, Life History and Habits of Two New Nematodes Parasitic on Insects. (One of these nematodes is parasitic upon *Saperda tridentata* and the other upon *Leucotermes lucifugus*.)—J. W. CHAPMAN and R. W. GLASER, Forest Hills, Mass., Some Non-bacterial Insect Diseases. (Methods of diagnosis, distribution and etiological investigations.)—E. W. BERGER, Entomologist of Florida State Plant Board, Fungus Parasites of Scale-Insects and White-Flies in Florida.* (Exhibit.)

ARANEINA.—J. H. EMERTON, Boston, Massachusetts, Circulating Collection of Spiders.* (Exhibit.)

ORTHOPTERA.—See under "Cytology" and "Genetics" above.

ODONATA. PHILIP GARMAN, University of Illinois, Specific and Individual Variation in the Gills of the Nymphs of Zygoptera.*

COLEOPTERA.—V. E. SHELFORD, University of Illinois, An Analysis of the Color-Patterns of Cicindela.*—C. C. HAMILTON, University of Illinois, Notes on a Twig-dwelling Cicindelid.*—See also under "Insects Injurious to Plants" and "Parasites of Insects" above.

LEPIDOPTERA.—J. R. WATSON, Florida Agricultural Experiment Station, Life History of *Anticarsia gemmatilis*.* (Exhibit.)—PAUL S. WELCH, Kansas Agricultural College, Contribution to the Biology of Certain Aquatic Lepidoptera.*—See also under "Physiology" and "Insects Injurious to Plants" above.

HYMENOPTERA.—J. W. MCCOLLOCH, Manhattan, Kans., A Preliminary Report on the Life Economy of *Solenopsis molesta* Say. (Data thus far obtained on the life history of the kafir ant.)—W. R. MCCONNELL, U. S. Bureau of Entomology, Notes on the Biology of *Paraphelinus speciosissimus* Girault.*—See also under "Physiology," "Insects Injurious to Plants" and "Apiculture" above.

DIPTERA.—ALVAH PETERSON, University of Illinois, The Epipharynx and Hypopharynx of the Diptera.*—J. L. KING, University of Illinois, The Life History of Pterodontia.—C. L. METCALF, Ohio State University, Metamorphosis of Syrphidae.*—E. N. CORY, College Park, Md., Notes on *Pegomyia hyoseyami* Panz. (Life and seasonal history.)—W. J. SCHOENE, Blacksburg, Va., Notes on the Biology of *Pegomyia brassicae* Bouche. (The more important observations on the life history of the species.)—See also under "Cytology," "Physiology," "Genetics," "Insects Injurious to Plants" and "Insects Injurious to Man," etc., above.

HEMIPTERA.—E. S. COGAN, Ohio State University, The Homopterous Mouth.*—H. A. GOSSARD, Wooster, Ohio, Distribution of Periodical Cicada in Ohio for the years 1906, 1914 and 1915. (Maps of the areas in which they appeared and remarks thereon.)—D. M. DELONG, Ohio State University, Notes on the Jassoidea of Tennessee.*—R. D. WHITMARSH, Wooster, Ohio, Life History Notes on *Apeteticus cynicus* and *maculiventris*.—EDITH M. PATCH, Maine Agricultural Experiment Station, Host Plant Outlines of a Few Aphids Based Upon Original Observations in Maine* (Exhibit) and Concerning Problems in Aphid Ecology. (An outline indicating certain phases of aphid study with especial reference to life cycle work with migratory species.)—R. W. COLEMAN and W. A. RILEY, Cornell University, Wax Model of Repugnatorial Glands and their Muscles in *Anasa* Nymph.—See also under "Physiology," "Insects Injurious to Man," etc., and "Parasites of Insects" above.

THYSANOPTERA.—See under "Physiology" above.

OBITUARY.

Professor FRANCIS MARION WEBSTER died of pneumonia in a hospital at Columbus, Ohio, at 4 a. m. of January 3, 1916, and was buried in Illinois on January 5th. His death removes an active and familiar figure from the annual entomological meetings and from the Federal Bureau of Entomology. Previous to assuming charge of grain- and forage-insect investigations for the United States Department of Agriculture in 1904, he was connected with State entomological work in Illinois, Indiana and Ohio, his title of Professor being derived from the chair of Applied Entomology at Purdue University, which he held from 1884 to 1888. He visited Australia and New Zealand in 1888-89 on a mission from the Federal departments of State and Agriculture.

Professor Webster was the son of J. S. and Betsey A. (Riddle) Webster and was born at Lebanon, New Hampshire, August 8, 1849. He married Maria A. Potter, of Sandwich, Illinois, August 21, 1870.

Extended notices of his life and work are in course of preparation for the *Journal of Economic Entomology*, *Science* and the *Proceedings of the Entomological Society of Washington*.

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☞ These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and only when necessary those at the top (being longest in) are discontinued

Wanted—Live pupae of *Argynnis diana*.—C. W. Allen, 812 N. 7th Ave., Maywood, Ill.

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Wanted—Living pupae of *Papilio asterias*, *P. zolicaon*, *S. cynthia*, *S. cecropia*, *promethea*, *io*, *polyphemus*, *regalis*, *imperialis*, *augulifera*, *rubra* and other Saturniidae in exchange or for cash.—A. F. Porter, Decorah, Illinois.

Wanted—U. S. Bur. Ent. Bul. n. s. 39; Tech. Ser. 1, 4. Circ. 1, 22, 52. Insect Life, Vol. 5, No. 5; U. S. Ent. Comm. Repts. 1 and 5.—College of Hawaii, Honolulu, T. H.

Coleoptera—Records of species desired for the preparation of a Manitoba list. Will persons having specimens or records kindly communicate with N. Criddle, Entomological Branch, Ottawa, Can.

Wanted—*Cicindela patruela*, *hertzii*, *modesta*, *auduboni*, *ancociscensis*, *imperfecta*, *rectilatera*, *abdominalis*, *formosa* and *unipuncta*. Fine North American and exotic specimens given in exchange.—Harry L. Johnson, South Meriden, Conn.

Send for my list of Coleoptera No. 1, January, 1916.—F. W. Nunenmacher, 1118 Oakland Ave., Piedmont, California.

For Exchange (specimen for specimen)—*Catocala titania* for *C. santa*, *C. jair*, *C. amestris*, *C. coelebs*, *C. olivia*, *C. canadensis*, *C. meskei*, from the east, *C. wernerii* and *C. beutenmuellerii*.—Ernst Schwarz, 6310 N. Newstead Ave., St. Louis, Mo.

Tremex columba (Hymenoptera)—Perfect specimens, male and female, offered in exchange for No. Am. Coleoptera and Lepidoptera.—Philip Laurent, 31 East Mt. Airy Ave., Phila., Pa.

Wanted—Bibliog. Amer. Econ. Entom., I-IV; Tech. Ser. Bul., 2-7; Entom. Circ., 1, 10, 17, 27, 40, 41, 44, 46, 89; Insect Life, Vols. 4-6; Nomenclator Zool. Cash or exchange.—Philip Dowell, Port Richmond, New York.

Wanted—*Papilio pilumnus*, *palamedes*, *aliaska*, *nitra*, *brevicauda*, *bairdi*, *ajax*, in exchange for Lepidoptera from my vicinity.—Adolph Mares, 2524 S. Homan Ave., Chicago, Ill.

For Exchange—Illinois and Indiana Coleoptera for North American species new to my collection.—C. Selinger, 1338 South 50th Avenue, Cicero, Ill.

Photographs of Entomologists Desired.

The Entomological Section of the Philadelphia Academy of Natural Sciences desires for its entomological album the photograph of every entomological student. The collection contains over 300 at this date. A list was published in the NEWS 1902, pages 45-47, of those in the album at that time. We hope that those who can do so will write their names and date of birth and the date when the photograph was taken on the back of each photo, along with any other information concerning themselves they may wish to impart.

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Trans. Amer. Entom. Soc., XLI, pp. 291-486.

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